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SUMMARY OF RECENT ABSTRACTS *

III. MALARIA †

General

Wilson (p. 1283) reports on the work of the East African Institute of Malaria and Vector-Borne Diseases for 1955–56. This includes work on age-grouping of *A. gambiae*, the results of insecticidal spraying with dieldrin, and other entomological work.

In the *Bulletin of the World Health Organization* (pp. 778, 918) various conference papers are published in which are discussed the analysis of epidemics, control by insecticides and mass treatment, experience with therapeutic malaria (in Rumania), the significance of splenic and hepatic enlargement, the genesis of epidemics, resistance to insecticides, variation in the behaviour of vectors, the precipitin test for identification of blood meals, and the use of radio-active isotopes for studies on insects. There are also maps of the distribution of anophelines in various parts of the world. The papers should be read in full.

Epidemiology

Malaria has ceased since 1950 to be endemic in Western Germany although *Anopheles maculipennis atroparvus* is still found in coastal areas; Weyer (p. 116), however, points out that breeding has decreased of late, though the reduction is not satisfactorily explained, and this is probably the reason for the disappearance of the disease. Wartena

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1957, v. 54. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series, see the March and April issues of the *Tropical Diseases Bulletin* each year since 1939.

(p. 383) shows that the incidence of malaria in Friesland fell from 716 cases in 1946 to 3 in 1955. *A. m. atroparvus* is the vector, breeding in salt waters.

In Serbia a malaria service was established in 1947, and a DDT campaign was started. Milovanović and Popović (p. 1284) give an account of the situation. Malaria decreased, but when spraying was reduced in 1953–54 an increase was observed; the campaign was then intensified.

In Israel there were formerly 2 annual peaks of malaria, in spring and autumn respectively. Saliternik (p. 384) states that 3 of the 4 vector species have now been suppressed, and with them the spring peak of disease. In spite of the entry into the country of large numbers of infected persons from malarious countries, the incidence of new cases has fallen from 1·04 per 1,000 in 1949 to 0·05 in 1955.

Colligon and Juillan (p. 917) continue to report very low indices of malaria in people living near the Ouled Mendil marsh in Algeria, which has been carefully controlled for 20 years.

Languillon *et al.* (p. 4) describe the epidemiological situation of malaria in the forest zone of the southern Cameroons; *Plasmodium falciparum* predominates, and *P. ovale* and *P. malariae* are found, but not *P. vivax*. There are many anopheline species—*A. gambiae* is not numerous; *A. moucheti* is an important vector; infection has been found in *A. nili*; *A. funestus* is rare and probably only a secondary vector.

Covell (p. 642) reports surveys of Ethiopia, where *A. gambiae* is probably the main carrier but 7 other species are possible supporters. *P. falciparum* predominates but *P. vivax* is also found. Between 5,500 and 6,500 feet above sea level endemicity is low but severe regional epidemics may occur. Below that level it is predominantly an epidemic disease, outbreaks occurring mainly in September to December. Guttuso and Lipparoni (p. 259) describe the malaria situation in a village in Somalia, where *A. gambiae* accounts for 97% of the anopheline population and malaria is perennial with increases to epidemic form. Anophelism is high in October–December and low in January–April.

Draper and Smith (p. 917) report a survey of the Pare area of Tanganyika, where holoendemic conditions exist in swamp areas where *A. funestus* is the chief vector, and where the intensity is relatively low in other parts. The apparent inoculation rate from entomological observations is about 27–50 times a year in swamp areas and 13–27 elsewhere, but the infant parasite rate indicates successful inoculation only once a year, a discrepancy previously noted. Sporozoite rates are low—0·5% and 0·31% for *A. gambiae* and *A. funestus*, and the mortality rates of these mosquitoes are high (15–20% per day); their gonotrophic cycle is 2–3 days. Application of an insecticide to produce a daily mortality of 50% or more might well interrupt transmission.

Husain and Talibi (p. 1047) report epidemic malaria near Karachi, and incriminate *A. culicifacies* as the principal vector. *A. stephensi*, *A.*

pulcherrimus and *A. subpictus* were common, but no infected females were found.

A survey in the North-East Frontier Agency (India) showed that malaria was hyperendemic in the foothills but absent from the heights; Misra (p. 781) shows that several anophelines are present and that *A. minimus* is probably the carrier. In one part of Rajasthan (India) malaria is seasonal and unstable, with occasional epidemics; in another it is relatively stable. Bhatia *et al.* (p. 1152) found sporozoites in *A. culicifacies* and *A. fluviatilis*.

Postiglione and Venkat Rao (p. 782) give a valuable review of the largely unpublished literature on malaria in Burma, and give a detailed account of the situation. There are 4 zones:—hill tracts (perennial hyperendemic malaria, vector chiefly *A. minimus*); plains (largely free except in foothills where irrigation is practised, vectors *A. minimus* and *A. culicifacies*); the delta (patchy distribution with irregular local epidemics, vectors not clearly known); coastal regions (malaria widely prevalent with perennial transmission, vector probably *A. annularis* but others may be involved).

In the annual report of the Malaria Advisory Board of Malaya for 1955 Anderson (p. 117) reviews the history of the disease since 1891, in 3 periods. Before 1904 incidence was high but without great fluctuations; in 1904–1940 it was epidemic with great fluctuations; since 1940 there has been a progressive decline. He discusses the reasons for this decline—the reduction of migration, and a change in the mechanism of rubber planting which does not now favour the breeding of *A. maculatus*, but incomparably the most important factor has been the wide adoption of prophylactic medication, largely with proguanil. Griffith and Lim Swee Choo (p. 783) studied the records of malaria in Perak North, Malaya, concluding that in this flat, water-logged area the incidence is normally low.

It is usually thought that there is no malaria in the highlands of New Guinea, but a survey by Spencer *et al.* (p. 1045) showed that this is not true; they found parasites in up to 78% of blood films there. *A. annulipes* and *A. farauti* are found and *A. punctulatus* may be present during epidemics; the disease is probably endemic, and sometimes epidemic, and may be spread by migrating labourers. In the Sepik district of New Guinea Peters and Standfast (p. 1383) found spleen rates over 75% below the age of 20 (90–100% below 4 years), and spleen sizes and parasite rates in proportion. *P. falciparum*, *P. vivax* and *P. malariae* were common, and gametocyte rates were high. *A. farauti* was the commonest anopheline on the coast, and could breed in brackish water; *A. punctulatus* and *A. koliensis* were dominant inland.

Malaria is prevalent in Central Taiwan, where Wu (p. 1382) found a spleen rate of over 50%, and high rates of *P. falciparum* and *P. vivax* infection. *A. minimus* was the most important vector, with *A. hyrcanus sinensis* next; several other anophelines were also found. Wu and

Chuang (p. 1383) found that the parasite rate increased as the spleen size increased from sizes 0 to 3; beyond that the samples were too small for valid conclusions.

Peñalver and Martinez Quehl (p. 385) report on hospital records of malaria in El Salvador, where the percentage of cases fell from 3·08 in 1949 to 0·45 in 1954, as a result of control measures.

Transmission

Canalis *et al.* (p. 5) follow Frizzi's method in using the structure of the chromosomes of fourth-stage larvae for identification of mosquitoes of the *Anopheles maculipennis* group when adults are difficult to obtain. In the Venice area where DDT has been used adults are not easily found but there are many breeding places with larvae. The authors have mapped out the haunts of the various subspecies.

Łukasiak (p. 386) reports that both *A. m. messeae* and *A. m. typicus* are found in Warsaw, *A. m. messeae* being the predominant race in Poland. *A. m. atroparvus* is found along the Baltic coast. He (p. 1286) also reports *A. claviger* from the Warsaw area.

Almazova *et al.* (p. 642) report a study of the age composition and epidemiological efficiency of *A. maculipennis* in the Altai region adjoining the Ob river of Russia. The transmission season in 1953 lasted 68 days, and in 1954 only 38. The account should be read in full.

Garrett-Jones (p. 1046) in Lebanon found evidence of migratory flight in several species of anophelines, and although this evidence does not indicate the maximum or average migratory range, migration may prove to be the prevalent or even universal behaviour rather than the exception. Pringle and Garrett-Jones (p. 1046) report *A. sergenti* from Iraq, for the first time.

Bertram and McGregor (p. 527) devised methods for catching *A. gambiae* and *melas* in Gambia, and demonstrated that visual mechanisms had no effect in determining the approach of the mosquitoes to a hut, but that the smell of human bait was important. If the direction of the wind was constant the smell was dispersed to leeward and the mosquitoes concentrated on that side of the hut. If only one trap was used for entry into a hut, serious sampling errors could result from changes of wind. The greatest activity of these mosquitoes took place between midnight and 6 a.m. Peters (p. 117) gives an account of the anophelines of Liberia where *A. gambiae* is the most important vector, with *A. funestus* (which is easy to control by house spraying), *A. melas* near the coast, and probably *A. hancocki* in the early part of the dry season when it is at maximum density. Binson and Doucet (p. 261) describe the anophelines of part of the Ivory Coast, where *A. gambiae* is the common species. In Abidjan (Ivory Coast) they (p. 1287) found that *A. gambiae* accounted for 92% of the anophelines taken in breeding places.

Bruce-Chwatt and Service (p. 920) describe an aberrant form of

A. gambiae from Nigeria and remark that separation of *A. gambiae* from *A. melas* by egg character alone is unreliable.

Lewis (p. 118) discusses the anophelines of the Sudan, and their distribution. Since the extermination of *A. gambiae* in the Wadi Halfa area malaria has been almost unknown there. *A. nili* may be a vector in the south but the status of *A. dthali* is uncertain. *A. funestus* is important and *A. rufipes* may be a vector in some parts.

Reid and Woods (p. 1385) have published a check list of the anophelines of Southern Rhodesia, where *A. funestus* and *A. gambiae* are the important vectors. Stream breeders are constant but pool breeders vary with the seasons, and the incidence of malaria is closely correlated with that of *A. gambiae*.

Halcrow (p. 1046) proposes the name *A. gambiae litoralis* for the salt-water form which occurs only in Mauritius; its status as a vector of malaria and filariasis is not known.

In Réunion *A. gambiae* does not appear to be able to maintain itself above 500 metres. Hamon (p. 761) shows that its main biting activity is between sunset and 3 a.m.; it bites cattle but also feeds on man. A large proportion feed out of doors, but also indoors just after sunset when human inhabitants are still active.

Bhatia and Krishnan (p. 1047) have published a condensed review of information on *A. culicifacies*. The food of anopheline larvae in West Bengal was investigated by Neogy and Kachroo (p. 261) who dissected the larvae and recognized 61 algae. The larvae are mainly herbivorous. An account of the mosquitoes of the Poona District of India, including the anophelines, is given by Ramachandra Rao and Rajagopalan (p. 1247).

Hodgkin (p. 387) gives a list of some 30 species of *Anopheles* found in Malaya, noting that some of them have now been subdivided into subspecies or closely related species, and that this has helped to clear up certain epidemiological mysteries. No species are house-haunting, and the usual methods for estimating the density of adults cannot therefore be applied. Known vectors include *A. maculatus*, *letifer*, *umbrosus*, *barbirostris*, "*hyrcanus*", *sundaicus*, and *baezai*. The sporozoite rate in old adults may be very high, but there may be infection with non-human parasites. This valuable monograph contains information on geographical distribution and importance of the various species.

A guide to the identification of the anophelines of Taiwan (Formosa) is given by Chang and Huang (p. 6). *A. minimus* and *A. hyrcanus sinensis* are found there, and Pletsch *et al.* (p. 1288 *bis*) observed that *A. minimus* tended to haunt houses rather than stables, but *A. h. sinensis* greatly preferred stables. The favourite haunts of *A. minimus* were underneath beds and furniture, inside roofs, and on the lower part of walls. 14·6% rested on objects not normally treated with insecticides.

A study of *A. walkeri* in the Tennessee Valley is reported by Snow and Smith (p. 643).

Frizzi and Ricciardi (p. 261) constructed a chromosome map so as to have a standard for comparison in the species of the *tarsimaculatus* complex, and record preliminary studies on salivary chromosomes of *A. aquasalis* and *A. albimanus*.

An account, with a key, of the anopheline larvae of Costa Rica is given by Vargas (p. 361).

Veloso *et al.* (p. 262) report a careful examination of the ecology of the anophelines of the subgenus *Kerteszia* in Brazil. Captures of adults were correlated with relative humidity. Correlation with the various types of plant community in which the bromeliads occur, and the microclimates suitable for the various species, indicated that *A.* (*K.*) *homunculus* and *A.* (*K.*) *cruzii* are closely related but that *A.* (*K.*) *bellator* is a more distant species. They also (p. 1385) report a study of the subgenus *Kerteszia* in the coastal regions of southern Brazil, in relation to the vegetation. The detailed information should be sought in the original.

Christie (p. 644) discusses the significance of the observed sporozoite rate when only a small number of mosquitoes are examined, and the use of existing statistical tables for estimating the true rates from the observed data.

Garnham (p. 784) describes microsporidian infection in laboratory cultures of *A. gambiae* and *A. stephensi*.

Aetiology

Field and Shute (p. 110) have published Volume 2 of their study on the microscopic diagnosis of human malaria, dealing with the erythrocytic parasites. This lavishly illustrated book contains, besides the hundreds of coloured and monochrome drawings, a considerable amount of text, which includes historical notes and descriptions of the parasites. Trager (p. 386) discusses the position of the malaria parasite—whether in or on the red cell—and comes down in favour of the intracellular position as a result of observations made by phase-contrast microscopy.

Covell (p. 263) gives an account of the work done at the Horton Hospital on the treatment of late syphilis by malaria therapy, and of the fruitful studies of the behaviour of malaria parasites, and of the course of malaria, which were possible there.

Ciuca *et al.* (p. 529) sum up their parasitological experiences in 30 years of malaria therapy of cerebral syphilis in Rumania. With transmission by inoculation of infected blood there was a tendency for gametogony to disappear. *P. malariae* infection could persist for 10 years, *P. falciparum* for 27 months and *P. vivax* exceptionally for 8 years. Re-inoculation with a heterologous strain of *P. vivax* was usually followed by a normal attack. *P. ovale* was much used, always by blood

inoculation; it retained its characters unchanged, and there was no cross immunity with other species. *P. knowlesi* was largely used, always by blood inoculation, and tended to become more virulent to man; there was some cross immunity with the human parasites, particularly *P. malariae*. The immunity acquired after *P. malariae* infection was of true sterilizing type in three-quarters of the cases, but with the other species it was premunition. This important monograph should be studied in full.

Zatz (p. 644) shows that blood infected with *P. vivax* and *P. malariae*, and stored in a solution of sodium citrate, citric acid and glucose, remained infective for 8 days.

Basu and Ray (p. 260) describe dividing forms of *P. falciparum* in the peripheral blood of adults.

In the Italian Province of Frosinone malaria control by insecticides and the treatment of infected persons has reduced the incidence almost to nil. Raffaele (p. 1051) studied the patterns of relapse in *P. vivax* and *P. falciparum* infection, and thinks that in *P. falciparum* there must be a secondary exo-erythrocytic phase, susceptible to treatment by drugs. He argues that blood-induced infections are readily cured by quinine, but that sporozoite-induced infections treated with quinine are subject to numerous relapses, which are rarely seen if mepacrine is used; this combination would be unlikely if there were no secondary exo-erythrocytic phase.

In discussing exo-erythrocytic schizogony in relation to drug prophylaxis Raffaele (p. 1285) makes the point that only the blood forms are affected by prophylactic drugs, and therefore *P. falciparum*, which gives rise only to merozoites which enter red cells, responds easily to prophylaxis, whereas the tissue-seeking merozoites of the other species are refractory. These histotropic merozoites of *P. vivax* and *P. malariae*, however, may disappear. In *P. gallinaceum* high doses of sporozoites tend to produce more histotropic forms.

Pathology: Immunity

Maegraith (p. 920) discusses some pathological problems of malaria, emphasizing the fact that signs of anoxia are present early in the disease, probably because respiratory enzymes are inhibited by some substance elaborated by the parasite. Local and general circulatory disturbances affect the liver to give centrilobular degeneration, and also the kidney and brain.

Sergent and Sergent (p. 7) relate the history of the concept of premunition, and compare it with true immunity. Premunition is a relative resistance, and the host remains a carrier of the pathogenic organism; it lasts only while the host is a carrier, and disappears with cure; it is conferred by live vaccines but does not form abundant antibodies; it is conferred by chronic infections. It prevents superinfection

while the host is a carrier, but does not prevent reinfection after the host ceases to be a carrier.

GILLES (p. 921) demonstrated *P. falciparum* in African infants in Gambia during the transmission season as follows:— age 1–2 months 10%; 3–4 months 42%; 5–6 months 53%. There was a striking inverse relationship between the mean parasite rate and the proportion of foetal haemoglobin at the various ages, but other protective factors such as possible maternal antibodies in the milk for a short time soon after birth may also have been important in determining the parasite rate.

LEHMANN and RAPER (p. 339) investigated the relationship between sickling and malaria in part of Uganda where the sickling rate is high, and they conclude, from the study of this rate and from the study of such vital statistics as are available, that the hypothesis concerning malaria as a cause of the high sickling rates receives support. The reasoning is close, and should be followed in the original; it is contested by WILSON (p. 339). WALTERS and BRUCE-CHWATT (p. 119) do not think that mortality from *P. falciparum* malaria is the main factor in determining the frequency of the sickle-cell gene in a population. In part of Nigeria the incidence of *P. falciparum* and the average intensity of infection are about equal in sicklers and non-sicklers under 1 year old, and immunity is uncommon before the third year. In comment Lehmann suggests that examination of greater numbers might reveal differences which would support the malaria theory, as in Uganda. LIVINGSTONE (p. 785) discusses published findings on sickling and malaria, and the probable mechanism of the immunity conferred on sickle-cell trait carriers against *P. falciparum*. The reasoning should be followed in the original abstract.

Clinical Findings

COUTELLIER (p. 120) makes the point that the presence of malaria parasites in the blood does not necessarily mean that malaria is the cause of the illness, and that they may be absent if the patient has taken an antimalarial drug. The leucocyte count may be very useful in diagnosis, especially in children; early polymorphonuclear leucocytosis does not contra-indicate malaria, but if it persists with treatment malaria is not likely to be the cause of the symptoms.

The possibility that hepatomegaly might be due to malaria in children in Togo was investigated by BEZON (p. 531) who found that the peak of incidence occurred later than that of splenomegaly, and lasted longer, and that though malaria prophylaxis was effective in halving the rate of splenomegaly it had no effect on hepatomegaly. Malaria may be associated with hepatomegaly, but other factors such as malnutrition may be responsible for it—the age of maximum incidence of hepatomegaly, for instance, corresponds with the post-weaning period when kwashiorkor develops. The influence of urinary schistosomiasis remains to be determined. BRUCE-CHWATT (p. 778) has made careful studies of spleen and

liver weight recorded at autopsy at Lagos in Nigeria. He calculates that the spleen becomes palpable in children when it is 1·6 times the normal weight, and in adults when it is 2·5 times the normal. Enlargement of the liver occurs in the first few years, but becomes progressively less marked; it is probably due to malaria.

A case of haemolytic anaemia ascribed to a delayed primary attack of *P. vivax* malaria is described by Cook *et al.* (p. 121) though in comment Maegraith suggests that it might have been the result of long-continued *P. vivax* infection rather than a delayed primary attack.

Bruce-Chwatt and Gibson (p. 1289) in Nigeria attempted to infect themselves with *P. ovale* by injection of infected blood after the normal daily proguanil had been suspended for 4 days. Each had an attack of malaria (one quite severe) in which *P. falciparum* was found. They conclude that mixed infection should be reckoned with, that a short break in chemoprophylaxis will permit infection, that *P. falciparum* may affect the nervous system very quickly, with a low degree of parasitaemia, and that treatment should not await confirmation of diagnosis by blood film.

A case of congenital *P. ovale* malaria is reported in England by Jenkins (p. 389), who comments on the danger that this condition could be mistaken for an early pulmonary infection. Treatment with chloroquine and proguanil was successful.

In Macedonia Tchakmakov (p. 388) examined 20 stillborn infants of mothers with malaria. Malarial pigment was found in liver and spleen, but no parasites were seen. The placenta was oedematous, with infarcts, necrosis and haemorrhages; malarial pigment was present, but parasites were found in only 1 case. The placental damage was enough to cause anoxia, which may have led to the initiation of respiratory movements and inhalation of liquor; the common cause of death was asphyxia. From an analysis of records of placental infection and prematurity of birth in Nigeria Archibald (p. 781) concludes that the infection may account for the premature birth of 2% of all infants there, and that this causes a high mortality risk in the neonatal period and later. Routine treatment of pregnant women with antimalarial drugs should be considered; it would probably not interfere seriously with their immunity.

Atkins (p. 1285) reports from Calabar, Nigeria, that 32 pregnant women with *P. falciparum* infection gave birth to 22 infants with positive blood films. He also suggests the use of chemoprophylaxis during pregnancy. Bruce-Chwatt (p. 1381), however, has not found anything like this high incidence in infants of African mothers with a substantial degree of tolerance of malaria—in 567 deliveries 22% of the placentas showed parasites, but only 1 newborn baby (and even that was doubtful). Congenital malaria is not uncommon in non-immunes, however. He agrees that treatment should be given to expectant mothers.

In a hyperendemic area of French Equatorial Africa Lacan (p. 1382) found malaria parasites in some infants at the age of 3 weeks, and in 10–30% by the age of 3 months, when gametocytes first appeared. The

child of 3 months to 6 years is the greatest reservoir of gametocytes, and he thinks that chemoprophylaxis should be universally applied in that period, and that this would not affect the acquisition of immunity. Pregnant women should also be given chemoprophylaxis.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Black, R. H. **The Epidemiology of Malaria in the Southwest Pacific: Changes associated with Increasing European Contact.** Reprinted from *Oceania.* Sydney. 1956, Dec., v. 27, No. 2, 136–42.

Malaria, always an important component of the background of social and economic happenings in Melanesia, and perhaps a shield against past Polynesian invasion, is now in a state of flux. It has been introduced with disastrous results to some places, such as Ontong Java and Rennell Island in the Solomons, and the Western Islands to the north of New Guinea which previously experienced anophelism without malaria. The increased movement of people largely due to pacification, but partly to search for employment, has led to many examples of severe epidemics not only in the acknowledged malarious terrain but also in the country of origin after the migrants' return. Anopheline breeding is being increased, partly by public works activities and partly by the introduction of new crops including *Ipomoea* and rice.

Malaria in Australia, certainly present since the first European contact, has recently declined but the present aggregation of the aborigines into settlements may favour its later recrudescence. Early discouraging opinions on the value of imagicidal attack are now giving way to a more hopeful outlook; schemes are being prepared in Netherlands New Guinea. These include the elaborate training of Melanesians, which itself advances their status, and have reasonable prospect of leading to a reduction of malaria in the future.

G. Macdonald

Saliternik, Z. *Anopheles sacharovi* **Favr in Israel.** *Riv. di Parassit.* Rome. 1957, Oct., v. 18, No. 4, 249–65, 6 figs. on 2 pls. & 3 graphs. [17 refs.] English summary.

Although much information in this paper is from previous publications by the author and his co-workers over the past 30 years, there are

interesting facts about the present-day position regarding *A. sacharovi*. This species, breeding throughout Israel, except the southern Negev desert, in 1949, has been found breeding in 1956 only in a limited area of the Huleh swamps and rarely in the Jordan valley. The causes are: larvicidal treatment of all breeding places before 1953, DDT residual spraying started in 1945, swamp drainage and control of horizontal vegetation in fish ponds by herbicides.

As regards malaria transmission in the past 5 years, a few cases (45 in 1956) are known either from frontier regions near the Huleh swamps or in the Jordan valley, *A. sergenti* occurring as well as *A. sacharovi* in both areas and *A. superpictus* also near the Huleh foci. All these species are under active attack by either adult control with residual DDT sprayings or larviciding. The trend has been for the cases to occur in October, owing to transmission mainly by *sergenti*, rather than in spring (July) and autumn (November), peaks characteristic of the incidence before the widely effective controls of the past decade.

It is observed that adults of *A. sacharovi*, where this species still occurs, if found in treated premises, are seen only on untreated surfaces or unsprayed wooden boxes slung from the ceiling. The author goes on to interpret this as a " change of habits " but the evidence briefly given would seem to the abstracter to indicate repellence from treated premises and surfaces by contact with DDT. Certainly, the brief comments given on this topic in the paper do not justify a more subtle and fundamental conclusion. *D. S. Bertram*

Houel, G. Note sur l'orientation trophique de *A. labranchiae* au Maroc. [**A Note on Feeding Preferences of** *Anopheles maculipennis labranchiae* **in Morocco**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 387–91.

The chief vector of malaria in Morocco is *Anopheles maculipennis labranchiae* which was thought to be strictly anthropophilic. In order to test this idea mosquitoes were collected from many different places which were grouped under 3 heads: (1) human habitations; (2) animal quarters; and (3) other natural or artificial shelters. The stomach contents of captured females were tested for the presence of human blood, and the blood of horse, sheep, cattle, goat, fowl and dog.

Of 2,168 stomachs examined 1,497 (69%) were positive for blood. Of these the total positive for human blood was 239, giving a total anthropophilic index of 15·9%, while the total zoophilic index was 84%. The anthropophilic index was greater in mosquitoes from human habitations than from either of the other 2 groups, but the total indices for each of the 3 groups of places showed very high zoophilic indices, *e.g.*, human habitations 73·9%, animal quarters 96·3% and other shelters 85·2%.

The author thus concludes that *A. m. labranchiae* in these Moroccan

conditions appears to be more zoophilic than anthropophilic, contrary to previous belief.

A report on the anthropophilic indices in treated and untreated areas will be published later and is expected to show whether DDT spraying influences the index. *H. S. Leeson*

Fox, R. M. *Anopheles gambiae* **in relation to Malaria and Filariasis in Coastal Liberia.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 598–620, 8 figs. [22 refs.]

During one year more mosquitoes were captured by two-man teams collecting in the open at night than were obtained either by trapping in exit traps at night by means of human bait, or by spray-catching resting mosquitoes in houses. The author points out that *Anopheles gambiae* (*melas* was excluded from these observations) feeds readily in the open, and does not need to enter houses, an assumption that is often the basis of malaria control spray programmes. All three methods of collecting showed a similar reduction of the adult mosquito over the dry season from November to March, but also showed that the adults never disappear completely at this time. Peaks in the number of mosquitoes collected followed peaks in rainfall by about one week, and the numbers increased, or decreased, with decreasing, or increasing, temperature. During the dry season, laboratory cultures of adult mosquitoes live longer but lay fewer eggs, and there is a higher larval mortality. Cooling increases egg production and reduces the loss of larvae.

Out of 12,322 *gambiae* captured during the 13-month period, 59·9% survived to be dissected after 3 days. Of 4,085 midgut dissections, 3·9% were positive, and 2·9% of 3,605 salivary gland dissections were positive. From this, and from the laboratory development of the parasite, the average life span of the mosquitoes dissected is believed to be about 27 days. By multiplying the weekly rate of oöcyst infection by the weekly catch per man-night, the most important season for transmission is shown to be from mid-April until the end of July, during the early part of the rainy season. There was no evidence of any difference in the rates of infection of those mosquitoes collected inside, and those collected outside, houses. Identification of the parasite species from oöcysts showed infections of 82·4% by *P. falciparum*, 8·8% by *P. malariae*, and 8·8% by *P. ovale* in the 64 mosquitoes examined. Three double infections of *falciparum* with *ovale*, and one double infection of *falciparum* with *malariae*, were found. Successive infections were suggested by marked differences in age between oöcysts, and by the presence of sporozoites with young oöcysts. No *vivax* infections were found. Fewer oöcysts were recorded in the posterior third of the midgut than in the anterior or middle thirds.

Infections with filarial worms were also recorded, and were found to be

higher (3·6% of total mosquitoes infected) than previously supposed. Third-stage larvae were found frequently in the abdomen, as well as in the head and thorax, of the infected mosquitoes. The period of greatest transmission of filariasis appears to be from May to July. No significant differences were found between the infections of mosquitoes captured inside houses, and those collected outside. *B. R. Laurence*

Mouchet, J. & Gariou, J. Exophilie et exophagie d'*Anopheles gambiae* Giles 1902, dans le sud-Cameroun. [**Exophily and Exophagy in *Anopheles gambiae* in the Southern Cameroons**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 446–61. [23 refs.]

For the purpose of this investigation into the behaviour of *Anopheles gambiae* collections were made in 2 experimental huts, in village huts and in the open, at the forest village of Biyan about 30 km. south of Yaoundé in the Cameroons, during the years 1955 and 1956.

The four classes of behaviour of *Anopheles* females put forward by Senior-White [this *Bulletin*, 1954, v. 51, 760], endophily, exophily, endophagy and exophagy, were examined.

Exophagous *A. gambiae* are probably also exophilous, thus ensuring the continuance of the species despite the insecticidal treatment of the huts, though this deduction is perhaps premature. However, these individuals have little to do with malaria transmission in this area.

More data are available on the endophagous group. Of these there are the exophilics which leave the houses in less than 12 hours after feeding. The proportion of these varies in a season from 50 to 20% and seems to be related to the proportion of newly emerged females and to the density of the mosquitoes in the houses. The behaviour of individual females may vary after a second blood meal.

The endophagous endophilics stay indoors at least 24 hours after feeding and of these 80% leave after about one day and only about 20% pass the whole of their gonotrophic cycle indoors. It is observed that analysis of the stomach contents of females found in outside shelters showed only human blood.

It is believed that this behaviour of the majority of the mosquitoes is deliberate, though the reason for leaving before digestion is complete is not known; but it is pointed out that the time spent in the houses is usually sufficient for them to have come into contact with any DDT which may be on the walls.

The efficacy of house spraying was demonstrated at another village where previously *A. gambiae* was very common in the huts. After spraying with DDT in March 1956, no *A. gambiae* were taken in 3 huts in November and December 1956; previous breeding places were without larvae, and larvae, where present, were very scarce. *H. S. Leeson*

Hecht, O. & Corzo, J. H. Beitrag zur Biologie einiger mexikanischer Anophelen. [**Observations on the Biology of Some Mexican Anophelines**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, No. 3, 391–404. [17 refs.]

With the change from larviciding to residual insecticides as the principal malaria control measure, the interest in vector biology shifted from the larva to the adult. This revealed some gaps in our knowledge. For example, the resting sites of female *Anopheles albimanus* between blood meal and oviposition were uncertain. The authors at first got the same erratic records of resting in houses as earlier workers. Eventually, they found that *A. albimanus* prefers to remain in houses with tall, palm-thatched roofs; but in hot or ill-ventilated houses the females try to escape after a meal, and often rest in nearby sheds or open shelters.

These aspects of behaviour throw doubt on the practice of spraying only the lower parts of walls with DDT, which is often done to save time and insecticide. The numbers of this particular mosquito might still be reduced by transitory contacts with sprayed walls, before they settled on the roof or in outbuildings; but malaria eradication and the prevention of resistance would seem to be more certain if all roof interiors as well as cattle barns and sheds were sprayed.

Whereas *A. albimanus* tends to enter houses in the evening, the mosquito *A. pseudopunctipennis pseudopunctipennis* mainly flies in at dawn and leaves at dusk [as shown by Bordas and Downs, this *Bulletin*, 1951, v. 48, 779]. The present authors also note that, in the hot coastal plains of Central America, this mosquito also prefers to rest in high, palm-thatched roofs.

The habits of *Anopheles vestitipennis* are again different. They fly to houses at night and rest on the lower portions of walls, both inside the house and outside (*e.g.*, on a verandah). A proportion find blood meals, and both blood-fed and hungry are to be found resting on walls for some hours. At dawn all fly away to unknown resting places. It is presumed that house spraying would reduce malaria transmission by this species.

J. R. Busvine

Restrepo, A. & Echavarría, A. Diagnóstico parasitológico de la malaria por el método de concentración-fagocitosis. Informe preliminar. [**Parasitological Diagnosis of Malaria by the Concentration-Phagocytosis Method**] *Bol. Oficina Sanitaria Panamericana.* 1957, Aug., v. 43, No. 2, 138–42, 5 figs. English summary.

The authors describe a new method for the diagnosis of malaria, based on the detection of phagocytosed parasites in leucocytes. This method was applied, in the case of 30 patients of Colombian hospitals with clinical signs of malaria, in the following manner: 5 cc. of blood removed by venepuncture were placed in a tube containing 2 drops of anticoagulant (20% potassium oxalate); this was incubated at 37°C. for 1 hour, and

centrifuged at 1500 r.p.m., after which the upper layer with leucocytes was removed with a pipette, and thick and thin smears were stained by Wright's method. In a modification of this method, in which the anticoagulant was omitted, the clot was broken up and the blood filtered through gauze. Stained thick and thin blood films served as controls. The index of phagocytosis in the leucocyte smears was assessed by counting 500 granulocytes and monocytes and estimating the proportion that had ingested erythrocytes, parasites or pigment.

This method was used both for the parasitological diagnosis and for the control of treatment. Positive results were obtained in 159 examinations by the " concentration-phagocytosis " method, in 102 thick and in 56 thin blood films. The effectiveness of the new method was thus 35·8% higher than that of the thick blood film. Moreover, there was no appreciable difference in the number of parasites detected with or without the addition of the anticoagulant. *C. A. Hoare*

Moise, R. Studio sull'infezione naturale da " Plasmodium ovale ". [**Study of Natural Infections with** *Plasmodium ovale*] *Ann. di Med. Nav. e Trop.* 1955, Nov.–Dec., v. 60, No. 6, 630–57, 1 chart & 5 pls. [14 refs.] English summary.

In the course of a long sojourn in Somalia, the author observed 15 cases of infection with *Plasmodium ovale*, 7 of which provided the material for the present study. A general account is given of the parasitological findings in each patient, after which the clinical course of the disease is discussed and a detailed description is given of the parasites and of the changes in host-cells, illustrated by 5 plates. As in other cases described in the literature, the *ovale* infections in Somalia ran a mild course terminating in spontaneous recovery. *C. A. Hoare*

Bruce-Chwatt, L. J. & Charles, L. J. **Chloroquine Naphthoate for Malaria.** [Correspondence.] *Brit. Med. J.* 1957, Aug. 31, 522.

The bitter taste of most antimalarial drugs causes difficulties in their use in children and preliminary trials were therefore carried out with chloroquine methylene-beta-hydroxynaphthoate (chloroquine embonate), a relatively insoluble and therefore tasteless drug. To naturally infected Nigerian children single doses of 100, 200 or 300 mgm. (base) were given and compared with the action of 100 mgm. (base) chloroquine sulphate (nivaquine) in controls, in all of whom the infection was eradicated in approximately 48 hours. By contrast eradication occurred in only 26·6%, 65·6% and 62·1% of those respectively given 100, 200 and 300 mgm. chloroquine embonate. In all patients in whom eradication occurred, however, whether in control or experimental groups, approximately 48 hours were required, suggesting that a proportion of children have a low absorption rate of chloroquine embonate, but that when an adequate amount of the drug is absorbed its activity approximates to

that of chloroquine sulphate. The authors wisely deduce that chloroquine embonate is unreliable both for treatment and suppression of malaria.

A. W. Woodruff

World Health Organization. Technical Report Ser. No. 123. **Expert Committee on Malaria, Athens, 20–28 June 1956. Sixth Report.** 84 pp., 2 graphs. [Refs. in footnotes.] 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] 3s. 6d.; $0.60; Sw.fr. 2.–.]

The sixth report like its predecessors [this *Bulletin*, 1954, v. 51, 1028] has a general theme, in this case malaria eradication, of which it constitutes a manual describing in comprehensive detail the mechanisms which will presumably be adopted in the majority of eradication schemes. After preliminary justification and definition, the report deals first with the principles of eradication, contrasting it with control, and giving a clear account of the theory underlying the final stages, and also of the criteria of eradication itself.

Planning and organization are dealt with in some detail, with emphasis on the granting of comprehensive powers and continuing finance to a distinct organization, which should include supply, training, professional and executive divisions. The programme itself is to fall into the 4 stages: preparatory, attack, consolidation and maintenance. Each of these is dealt with in detail but most interest lies in the description of the mechanisms of surveillance which constitute the last stage of active work for achievement of the objective. Though almost all schemes will be based on imagicidal control the Committee does not exclude the use of larvicidal methods in special circumstances, but it is clearly loath to accept proposals that mass therapeutic campaigns should be combined with the insecticidal attack.

The report concludes with a classification of personnel employed in anti-malaria campaigns, a guide for the presentation of malaria eradication programmes, and information on data to be included in reporting the results and cost of programmes. [To all those engaged in any aspect of malaria eradication this will be an indispensable guide manual.]

G. Macdonald

World Health Organization. **Malaria Section, Summary of Information received. Assessment of Susceptibility to Insecticides in Anopheline Mosquitos.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 4, 874–90.

Standard equipment for testing the susceptibility of mosquitoes to insecticides has now been widely distributed and this paper brings together a considerable body of data for levels of susceptibility to DDT, gamma BHC, and dieldrin in several territories of Europe, Africa, Central and South America, the Middle and Far East. The results, derived by

the Busvine test (*World Health Organization Technical Report Ser. No. 80*, 1954, p. 30 [this *Bulletin*, 1954, v. 51, 1028]) are tabulated with considerable details, and concern nearly 20 species of anophelines. In the absence of previous insecticide treatments, the level of susceptibility of anophelines is fairly uniform with a DDT LC50 value by this test of 0·5 to 1·5%. *A. leucosphyrus leucosphyrus* and *A. l. balabacensis* of Borneo are more susceptible to DDT than other anophelines, and this seems probably true of *A. superpictus* in Greece and *A. sundaicus* in the oriental region (Burma, Java).

Strains from treated areas usually show a higher LC50—clearly so for DDT for *A. hyrcanus sinensis* (Taiwan), *A. gambiae* (Belgian Congo), and *A. l. balabacensis* (North Borneo)—but the difference is of the level of " vigour tolerance " rather than marked resistance.

There is, however, marked resistance to DDT in *A. sacharovi* in the Peloponnesus, Greece, where there has been prolonged use of DDT and other chlorinated hydrocarbon insecticide. The DDT LC50 is of the order of 122 (calculated). This species is also showing some " vigour tolerance " on the Grecian mainland.

Certain rather high LD50 values (*A. maculipennis*, *A. quadrimaculatus*, *A. aztecus*, and *A. albimanus*) are thought attributable to the mosquitoes being ready to hibernate.

From the Belgian Congo there is evidence of some tolerance to dieldrin after DDT treatments; this may be " vigour tolerance " only.

The development of associated dieldrin-BHC resistance as observed in Western Sokoto of Northern Nigeria has not yet appeared in Ilaro, Southern Nigeria, despite repeated treatments with BHC.

D. S. Bertram

Belios, G. D. **The Elimination of Residual Malaria Foci.** *Arch. Hyg.* Athens. 1957, v. 7, Nos. 1/6, 45–9.

Experience of the long campaigns in Greece gives a guide for future programmes. The original insecticidal attack should be extremely thorough, employing heavy doses of insecticide, reaching all parts of the area, and should be continued for a sufficient length of time and often for more than 4 years. It might legitimately be combined with limited larvicidal programmes, but relatively ineffective measures such as aerial application of DDT should be avoided. The early stages having been passed, a sound technical appraisal of results is essential, and provision should be made for a highly flexible form of attack on residual foci. The last stage of surveillance is accompanied by chemotherapy and might possibly be associated with selective chemoprophylaxis. In Greece residual foci have been found to be due to:— previous failure to detect and treat malarious areas; difficulties of terrain; migration of mobile groups; anopheline resistance; and administration difficulties arising out of the large number of previously recrudescent foci. *G. Macdonald*

Belios, G. D. L'immunité collective résiduelle contre le paludisme en Grèce. [**Residual Malaria Immunity in Greece**] *Arch. Hyg.* Athens. 1957, v. 7, Nos. 1/6, 35–8.

Malaria control has been established throughout most of Greece since 1946 and preconceptions would lead to the belief that the immunity of the population would by now have disappeared. There is still a little residual malaria, almost entirely due to *Plasmodium vivax*, and study of it suggests that there is still a strong continuing immunity. Clinical cases are mild, they are readily responsive to treatment, the relapse rate is low and the usual density of parasites very low, while such outbreaks as occur tend to be highly localized, small and brief. Moreover, only 9 Greek soldiers returning from Korea relapsed with *P. vivax* malaria, whereas over 21,000 infections were found in American soldiers, and in Greece itself the age distribution of malaria persists unchanged from the time when the disease was universal and hyperendemic Immunity has persisted for an unexpectedly long time and its continuance should be an aid in eradication.

G. Macdonald

Hadjinicolaou, J. [**Susceptibility Tests of Certain Greek Mosquitos to the Chlorinated Insecticides**] *Arch. Hyg.* Athens. 1957, v. 7, Nos. 1/6, 50–58. [In Greek.] English summary 59–60.

This is a brief summary in English of a report submitted in Greek to the Greek Ministry of Social Welfare on the susceptibility to insecticides of certain Greek mosquitoes. Tests were made with DDT on *Anopheles sacharovi* in Asterion (Peloponnesus), Anthili (central Greece) and Nea Komi (northern Greece); on *A. maculipennis* in Poros, near the Turkish border; on *A. superpictus* in Triada (northern Greece); and on *Culex molestus* in Athens. Dieldrin and lindane were also tested on the same species in all but 2 of these areas. All the areas, except Triada, had been sprayed regularly with DDT from 1946 to 1954 and some of them with BHC, chlordane or dieldrin in 1955 and 1956.

The results are shown in tables in the Greek text. There was great variation in susceptibility between species of mosquitoes and even in the same species in different places. For example, in Asterion, the MLC [median lethal concentration] for *A. sacharovi* was far above a DDT concentration of 4%, while in Anthili and Nea Komi it was 3% and 2·7%. In fact, in Asterion the MLC rose well above usual levels, in fact to a theoretical level of 122%.

A. sacharovi and *C. molestus* appeared to be resistant to dieldrin and lindane. *A. maculipennis* and *A. superpictus* (especially the latter) were somewhat susceptible to DDT, and to dieldrin and lindane.

H. J. O'D. Burke-Gaffney

Burnett, G. F. **Trials of Residual Insecticides against Anophelines in African-Type Huts.** *Bull. Entom. Res.* 1957, Sept., v. 48, Pt. 3, 631–68, 9 figs. [19 refs.]

Davidson [this *Bulletin*, 1953, v. 50, 1011] has described trials of residual insecticides in experimental huts in Taveta, Kenya, in relation to malaria control. After Davidson's departure in 1951, the author of this paper continued the series of tests, using the same technique. It is one which gives a good impression of the action of insecticides under natural conditions, but it suffers from many uncontrollable factors which make the results difficult to interpret. Each test is made with knapsack sprayers, and the wall deposits are irregular and not always exactly at the required dose. (Application methods have, however, been improved since the first tests.) The recording of mortalities is sometimes complicated by ants, which remove most of the dead mosquitoes in some huts, and it is almost impossible to exclude the ants altogether. As was later discovered, the weather has an effect on degree of absorption of the residual deposit, so that in rainy periods the insecticides become more active than in dry seasons. The degree of absorption of insecticides away from the surface varies considerably in different types of soil; absorptive mud is generally described as "active" and non-absorptive material as "inactive". These properties affect different insecticides in various ways. DDT is most effective and persistent on inactive mud and less effective on active walls. The reverse is true of BHC, which can act in the vapour phase after absorption. Dieldrin is intermediate in character.

These facts, partly discovered by previous workers, were confirmed by the author's tests. He also showed that the smoke from wood fires in huts quite rapidly renders dieldrin residues ineffective, though BHC deposits are not affected. He also investigated the effects of second applications of dieldrin in huts at a period when the first treatment was falling off. It appeared that the second treatments were much more persistent than the first and this might allow economies to be made.

Judging from his trials, the length of time of effective action of various treatments (over 50% kill of mosquitoes) were as follows:—

2·5	gm./m.²	DDT	on active mud,	8	months
0·24	,,	gamma BHC	,, ,, ,, ,	9	,,
0·24	,,	,,	,, inactive ,, ,	3–4	,,
0·49	,,	dieldrin	,, active ,, ,	24	weeks
0·42	,,	,,	,, inactive ,, ,	44	,,

On mud of intermediate character, dieldrin at 0·8 mgm./m.² would be effective for 1–2 years. Mixtures of DDT and BHC did not show any advantage. BHC in a urea-formaldehyde resin at a very heavy rate (2·5 gm./sq. m.) was persistent, but not to a degree commensurate with its cost.

In regard to malaria control, BHC is recommended for places with a short sharp transmission season. DDT would be most satisfactory for areas with a longer transmission period, especially with labour forces difficult to protect from the toxicity hazards of dieldrin. Finally, dieldrin would be best for very intense malaria with a long transmission season, especially where an effort to secure eradication was being made.

J. R. Busvine

Neogy, B. P., Kachroo, P. & Biswas, K. **Aquatic Vegetation of Bokaro Reservoir in relation to Anopheline Mosquito Larvae and its Control by Application of Herbicides.** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 191–212, 5 figs. (2 on 2 pls.) & 3 charts. [19 refs.]

Anopheles culicifacies, *A. subpictus*, and *A. annularis* and a few other anopheline species breed in the peripheral zone of aquatic vegetation of Bokaro Reservoir in Damodar Valley, India. Water-level management is not suitable as a means of controlling this aquatic vegetation, as the reservoir is essentially a constant-level pond with a permissible draw-down of only 1·5 ft. Some filling-in was successful, but the paper reports mainly on detailed surveys of the vegetation and on the effectiveness of three herbicides in their control, *viz.*, copper sulphate, Dicotox (ethyl ester of 2,4-D) and Chloroxone (80% sodium salt of 2,4-D)—the last two compounds being derivatives of the growth-hormone 2,4-dichlorophenoxy-acetic acid effective in killing broad-leaved plants. Tables, graphs, and photographs illustrate the effects obtained by spraying these herbicides experimentally on the vegetation along the reservoir edge.

Grasses and submerged flora were unaffected, but *Polygonum* and *Scirpus* and several other plants were killed by dosages of 12 oz. per 45 sq. ft. (Dicotox), 2½–5 lb. per acre (Chloroxone) and, for a few plants, 8 gm. per acre of copper sulphate. Some secondary budding of *Polygonum* occurred within 2–3 weeks after treatment with Dicotox and Chloroxone, necessitating retreatment. Killing-time varied with plant and herbicide from a few hours to 6 weeks. It is thought that for best results such operations should be carried out when the plants are in the vegetative stage and the reservoir is at its lower level.

D. S. Bertram

Ronnefeldt, F. Beobachtungen über das Verhalten von *Anopheles punctimacula* nach der Anwendung von DDT. [**Observations on the Reactions of *Anopheles punctimacula* to Spraying with DDT**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, No. 3, 376–91. [13 refs.]

In spite of some gaps in our knowledge of *A. punctimacula*, there are good reasons for believing it an important vector of malaria in Central America. The author has studied its reaction to DDT house spraying in

hill regions of Colombia, where there are many plantations of coffee, with their shade trees, and houses scattered among them. The mosquito populations were assessed by hand catching inside and outside houses and on the trunks of shade trees, where the insects commonly rest by day. Between 1953 and 1956, houses of a small settlement in the area were sprayed with DDT at 2 gm./sq. m., 5 times (at intervals of 6–11 months). Since houses were constantly being built, not all the dwellings would be sprayed at any given time.

The catches of mosquitoes reflected the mosquito's breeding cycles through the year, being highest in May to August and December to February. The effects of DDT spraying were to decrease indoor catches and increase the proportion of blood-fed females taken on outdoor sites such as tree trunks (these mosquitoes were presumably driven out of the houses). Finally, catches inside and in the immediate neighbourhood outside houses became negative. Parasitaemia virtually disappeared from the human population after the third spraying.

In a rather similar area where the parasitaemia was down to 6·3% after a second DDT spraying, a careful survey was made of the location of houses, mosquitoes and cases of malaria, with the help of an air photograph. The general conclusion of all the work was that, despite the rather strong exophily of *A. punctimacula*, it appeared that 2 or 3 DDT sprayings very greatly reduced its power to transmit malaria in a community. *J. R. Busvine*

Bray, R. S. **Studies on Malaria in Chimpanzees. IV.** *Plasmodium ovale*. *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 638–45, 4 figs.

The author has continued to make use of the chimpanzee as a most valuable tool in the study of the human malaria parasites [this *Bulletin*, 1958, v. 55, 11, 12] and in this paper describes the results of two experiments in which *Plasmodium ovale* (of Liberian origin) was successfully inoculated into these animals in the form of sporozoites derived from a strain of *Anopheles gambiae* maintained in the laboratory. The mosquitoes readily became infected from a human gametocyte carrier in the first experiment and from a chimpanzee in the second; many of the oöcysts showed the typical cross pigment formation and sporozoites reached the salivary glands in 12 days. In the first experiment 9 sets of glands were inoculated into a splenectomized animal. Rings of *P. ovale* appeared in the blood in 10 days and subsequently a heavy infection developed with many gametocytes, and during this period a batch of mosquitoes were fed on the chimpanzee. A 70% infection followed and 312 glands were inoculated in the second experiment into an intact chimpanzee. In exactly 9 days parasitaemia ensued, but disappeared in 8 days. The blood parasites showed the normal characteristics, the usual number of merozoites being between 10 and 14.

Biopsies of liver were taken in the second experiment on the 7th, 18th and 39th days after infection, and the tissue stages are described in detail. The 7-day-old schizonts occurred in four forms (1) with nuclei clumped in the interior, (2) with bar-shaped nuclei arranged tangentially on the periphery of the parasite, (3) *cynomolgi* type, and (4) suggestion of cytomere formation. In all these forms the nuclei were large and Feulgen negative, the schizont itself measuring on an average 37 μ × 30 μ. The negative Feulgen reaction of these nuclei suggests that the estimation of age of 7-day schizonts by Garnham *et al.* [this *Bulletin*, 1955, v. 52, 1046] was incorrect, because the nuclei of the latter were all strongly Feulgen positive (in other respects details of the earlier work were confirmed). The 18-day biopsy revealed one " giant " first generation form with nuclei of the *Nycteria* type [*ibid.*, 1954, v. 51, 355] and the remainder as second generation schizonts exhibiting a peculiar feature: deposition of pale staining chromatin in large masses (up to 7 μ across) on the periphery, with the true nuclei lying in the interior. The presence of a schizont in the 39th day biopsy material demonstrated the persistence of the tissue phase in *P. ovale*.

These experiments show that the chimpanzee possesses a partial resistance to erythrocytic, but not to pre-erythrocytic, stages of *P. ovale*, while splenectomy breaks down resistance to the former but is without influence on the latter stages. *P. C. C. Garnham*

Carrescia, P. M. & Arcoleo, G. Importanza della virulenza del ceppo di *Plasmodium berghei* nel determinare infezioni ad andamento rapido nei topi albini. [**Strain Virulence in** *Plasmodium berghei* **as a Factor determining Acute Infections in Mice**] *Riv. di Malariologia*. 1957, June, v. 36, Nos. 1/3, 65–72, 1 graph. English summary (8 lines).

The authors note that their strain of *Plasmodium berghei* is progressively losing its capacity to produce rapidly fatal infections in passage mice. Infections of this type last 6–10 days and are characterized by high parasitaemia with invasion of mature erythrocytes (normocytes), in contrast to protracted infections, which last 15–20 days and affect basophilic macrocytes.

The experiments described in this paper were carried out in order to ascertain the effect upon the course of infection of the virulence of the strain, which was increased by rapid passages (every 3 days) through 79 mice, inoculated intraperitoneally with heavy doses of parasites. The form of infection produced was distinguished by the course of parasitaemia and the type of host-cells involved.

The results are shown in graphs and tables, from which it is seen that the infection was of the macrocytic type in 60·7% of mice and normocytic in 39·3%. Moreover, since the proportion of normocytic infections was

21·5% during the first 27 passages and 58·4% during the following 27 passages, it is concluded that the rise in the acuteness of the infection through successive passages was due to a progressive increase in the virulence of the strain. *C. A. Hoare*

Carrescia, P. M. & Arcoleo, G. Analisi del sesso, della curva ponderale e del comportamento del fegato e della milza nei due tipi di infezione da *Plasmodium berghei* di topi albini. [**Changes in the Weight of the Liver and Spleen in Two Types of** *Plasmodium berghei* **Infection in Mice**] *Riv. di Malariologia.* 1957, June, v. 36, Nos. 1/3, 73–81. [11 refs.] English summary.

With the object of determining further [see above] the factors responsible for the chronic (macrocytic) and acute (normocytic) courses of infection with *Plasmodium berghei*, the authors studied, in 29 mice, changes in the weight of the liver and spleen, as compared with these organs in normal mice. The weight of these organs was estimated in percentage of the animals' body weight, the average for each group being used as a standard for comparison with their weight in normal controls.

The experimental animals were divided into two groups according to the type of infection. It was found that in normocytic infections the weight of the spleen was 66% greater than that in normal animals, while in macrocytic infections the increase was 134%, whereas the corresponding increases in the weight of the liver were 2 and 15%. *C. A. Hoare*

Corradetti, A. & Verolini, F. Dimostrazione che l'immunità acquisita del ratto albino al *Plasmodium berghei* è una immunità assoluta. [**Demonstration of Residual Immunity acquired by Rats infected with** *Plasmodium berghei*] *Riv. di Parassit.* Rome. 1957, Apr., v. 18, No. 2, 65–8. English summary (7 lines).

One of the authors has previously demonstrated that rats, which had survived after an acute attack of malaria produced by *Plasmodium berghei*, recovered from the infection by the 50th day and remained resistant to reinfection up to 445 days after the primary attack [this *Bulletin*, 1951, v. 48, 619; 1956, v. 53, 545]. The disappearance of the parasites after 50 days finds support in the fact that they failed to repopulate the blood after the rats had been splenectomized, and in the successful reinfection of these animals.

Although this can be interpreted as evidence of residual immunity, it was conceivable that some parasites might have escaped detection and that the acquired resistance was in fact due to premunition. It might also be argued that the parasites had survived in the spleen and were therefore artificially eliminated when this organ was removed in the course of the above-mentioned experiments. This possibility was put to the

test, the results of which are described in the present paper. In these experiments 60 rats, which had recovered from the infection, were splenectomized from 3 to 10 months after the primary attack, and the spleen pulp of each was inoculated intraperitoneally into 2 "clean" rats, after which the blood of all the experimental animals was examined daily.

The results were in all cases negative, for neither the donors nor the recipients showed any evidence of infection. It was thus demonstrated beyond all doubt that the resistance to *P. berghei* infection acquired by the donor rats is not due to premunition but represents absolute residual immunity, probably persisting to the end of the host's life.

C. A. Hoare

Carrescia, P. M. & Arcolfo, G. Infezione da *Plasmodium berghei*: fenomeni immunitari in infezioni cronicizzate con clorochina. [**Immunity to** *Plasmodium berghei* **in Infections running a Chronic Course induced by Chloroquine**] *Riv. di Malariologia*. 1957, June, v. 36, Nos. 1/3, 51–63. English summary.

The authors describe experiments designed to promote the development of immunity against *Plasmodium berghei*, by treating infected mice with chloroquine in doses small enough to reduce parasitaemia and to prolong the course of infection.

For this purpose 35 mice, each inoculated intraperitoneally with 30–40 million parasites, were treated repeatedly with chloroquine in doses of 5 mgm. kgm. of body weight, administered subcutaneously during the primary attack and at each relapse. The course of parasitaemia was determined by examination of the blood and—in microscopically negative cases—by subinoculation of clean mice. The degree of acquired immunity was assessed by challenging those mice, which showed no parasites for long periods, with inocula of 20 million parasites.

Although the mice proved to be highly susceptible to infection, even during latency induced artificially by the drug, evidence of a certain degree of acquired immunity was provided by the long duration of the latent period, by spontaneous recovery of the mice from relapses, by the low grade of parasitaemia lasting up to 6 months, and by the great number of negative cases among subinoculated animals.

The results are shown in tables and are illustrated by graphs.

C. A. Hoare

Rudzinska, Maria A. & Trager, W. **Intracellular Phagotrophy by Malaria Parasites: an Electron Microscope Study of** *Plasmodium lophurae*. *J. Protozoology*. Utica. 1957, Aug., v. 4, No. 3, 190–99, 13 figs. [34 refs.]

Electron microscopy revealed many interesting morphological features of *Plasmodium lophurae*. The material was obtained by centrifuging

infected blood at 1,000 r.p.m. for 10 minutes at 0 C.; the pellet of infected cells was fixed for 45 minutes at the same temperature in 1% osmic acid (buffered); after methacrylate impregnation, sections were cut at 50 mμ. The original paper must be consulted for details of the structures described, but the most important observation was the discovery of the large food vacuole originally called the residual body. This is about 2 μ long and is of the same consistency as that of the cytoplasm of the erythrocyte; it has a fine limiting membrane on which are attached the malaria pigment granules up to 8 in number, or occasionally more. The food vacuole is formed from the cytoplasm of the host cell by invagination of the parasite's limiting membrane; in other words intracellular phagotrophy is occurring. Details of the mitochondria, lipids and other structures are given; the nucleus contains a dense body which may be a chromosome, but further studies on this structure are necessary.

P. C. C. Garnham

Jacobs, H. R. **Effect of Ornithosis on Experimental Fowl Malaria.** *Proc. Soc. Exper. Biol. & Med.* 1957, June, v. 95, No. 2, 372–3.

Young ducklings were infected intravenously with the virus of ornithosis. 10 to 12 days later the birds were inoculated with *Plasmodium lophurae*. 96·5% of 156 birds survived the malaria challenge and exhibited a mild parasitaemia; similar proportions were found in a second experiment. In the respective controls, where the ducklings received no virus, 9 and 7% only survived. Thus ornithosis confers a high degree of resistance to *P. lophurae* in ducklings, associated with hyperplasia of the reticulo-endothelial cells in the liver and spleen. *P. C. C. Garnham*

Manwell, R. D., Weiss, Margaret L. & Spandorf, A. A. **Effect of Splenectomy on *elongatum* and *circumflexum* Malaria in Ducks.** *Exper. Parasit.* New York. 1957, July, v. 6. No. 4, 358–66. 1 fig.

White Pekin ducklings about 3 or 4 days old and occasionally much older, were infected with (a) *Plasmodium circumflexum* and (b) *P. elongatum* (both strains of American origin). The course of the infection was followed in splenectomized and intact birds. Splenectomy was done under Nembutal anaesthesia with minute quantities of the drug. *P. circumflexum* ran a light and ephemeral course unaffected by the removal of the spleen. *P. elongatum* behaved differently: much higher parasitaemias occurred in splenectomized ducklings than in the intact controls, while the normal age resistance of ducks to this species of parasite was broken down by splenectomy, and the infection persisted in such birds indefinitely. About 5% of ducklings possess an innate resistance to *P. elongatum* and this is undisturbed by removal of the spleen.

P. C. C. Garnham

Polizzi Sciarrone, M. Sull'immunità innata del pulcino al *Plasmodium praecox*. [**On the Innate Immunity of Chicks to** *Plasmodium praecox*] *Rendiconti Istituto Superiore di Sanità*. Rome. 1957. v. 20, Pt. 3, 267–71. English summary (9 lines).

The author inoculated 29 chickens with the blood of canaries infected with Corradetti's strain of *Plasmodium praecox*, which had originally been isolated in Italy from a sparrow. The blood of the chickens was examined daily for 20 days, and was subinoculated into "clean" canaries at periods from 1 minute to 48 hours after inoculation of the donors. However, no parasites were detected either in the chickens or in the canaries, whereas control canaries, which had been inoculated at the same time as the chicks, became infected.

It is thus evident that chickens have an innate immunity to infection with the Italian strain of *P. praecox*, which leads to the elimination of the parasites within one minute after their inoculation. These results are in contrast to those obtained by Maxwell, who succeeded in infecting chickens with an American strain of *P. praecox* [this *Bulletin*, 1933, v. 30, 735].

In discussing these experiments the author concludes that *P. praecox* is represented by strains differing in their power to overcome the natural immunity of chickens. It is also known that in various parts of the world this species is represented by strains differing in the following biological characteristics: (1) ability or inability of the erythrocytic forms to invade cells of the reticulo-endothelial system, (2) predilection of some strains for development in the cerebral capillaries, or in the liver, spleen and bone-marrow, in others, and (3) restriction of the exo-erythrocytic development to diverse tissues, according to the host.

It is suggested that these biological differences can serve for the differential diagnosis of the strains of the parasite in question.

C. A. Hoare

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African*—human, animal;* American*—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Tanganyika. Medical Department. **Sleeping Sickness Service Annual Report 1956** [Apted, F. I. C.]. 16 mimeographed pp. & 1 coloured folding map. 1957. Tabora: Sleeping Sickness Office, P.O. Box 19.

This report records a very satisfactory year's work but also emphasizes the unpredictable nature of sleeping sickness. In the year reviewed the number of cases diagnosed, 646, was nearly 300 less than in 1955 [this

Bulletin, 1956, v. 53, 1223], but several small outbreaks occurred such as that in Maswa and Mwanza Districts which had been free of the disease since 1938. Another new focus was discovered in Ngara District of the Lake Province where more than 100 cases were found. It is under control but is still active; anti-tsetse measures are to be started. A small epidemic flared up in Bukoba towards the end of 1955 but prompt action brought it rapidly to an end and the focus seems to have died out. A marked fall in sleeping sickness incidence has taken place in the Western Province, being most marked in Tabora District where only 80 cases were noted as compared with 300 in the previous year. The improvement can be attributed in part to the cumulative effect of bush clearance and, in particular, settlement control.

A large variety of measures aimed at the control of sleeping sickness is needed for the many different ecological conditions. The measures used in Tanganyika include settlement, evacuation, fly control by discriminative clearing, mass chemoprophylaxis, and improved markets and the development of cash crops to raise population density. Population settlement has proved very effective and it is stressed that the settlement must be maintained even when the incidence is low. A survey in the Eastern Province showed that people had been drifting back to their old homes from the settlement made in 1949 and that resettlement was necessary. In part of Biharamulo District in Lake Province the infection persists and the area is being evacuated because the population is too small to maintain adequate bush clearance. Discriminative clearing is used adjacent to but outside settlements, in order to free forest of the fly. Chemoprophylaxis has been used successfully for 3 years in one area on Lake Tanganyika because rapid regeneration makes bush control impossible. Depopulation in Kahama is being countered by settlement and the development of a cash crop. Honey and beeswax collecting centres have been established in one district of Western Province in order to improve marketing and facilitate supervision of those occupationally exposed to infection.

Mel B has been used in the sleeping sickness hospital at Tabora for treating all but early cases, and has given good results. Some new drugs have been tested but are not yet ready for reporting. Two African settlement officers were trained and it is proposed to recruit 3 more so as to relieve the settlement officers of routine and give them more time for larger schemes and for supervision. A map accompanies the report showing the centres affected and the number of new cases during 1956.

T. H. Davey

Rainaut, J. Refléxions sur la structure et la pathogénie des troubles mentaux dans la trypanosomiase humaine africaine. [**Observations on the Nature and Pathogenesis of Mental Affections in Human Trypanosomiasis in Africa**] *Bull. Méd. de l'A.O.F.* Dakar. 1957, v. 2, No. 2, 230–36. [10 refs.]

From the writings of earlier workers on trypanosomiasis a classification of the mental effects of the African disease has been elaborated by the authors as follows:—

1. a prodromal period, often undiagnosed, which approximates to the condition described as neurasthenia;
2. a period on onset which predominantly is either depressive or exaltative in type; or else a very gradual development of mental enfeeblement, forgetfulness, bodily neglect, and irrationality;
3. a period marked by progressing mental deterioration with increasing impulsiveness and irresponsibility tending towards a paranoid state with increasing incoherence;
4. a terminal period of dementia with complete incoherence progressing through cachexia to marasmus and death.

These periods have no fixed duration, and they vary with the individual. There are factors peculiar to the individual, and factors appertaining to his conditions of life, which influence them. Of the former the intellectual level plays an important part; the latter factors include the state of nutrition, the presence of concomitant infections, and alcoholic habits. The actual trypanosomal infection, therefore, does not alone determine the mental complications precipitated by the disease. Mental involvement in trypanosomiasis occurs considerably more frequently than does general paralysis of the insane in syphilis. Nevertheless there are striking similarities between the two diseases in their mental aspects. Neglect of the observations of the older workers, and the small amount of psychiatric work done where sleeping sickness is prevalent, lead to many diagnostic errors. It has been accepted for too long that central nervous system complications of syphilis are rarely seen in the African; that this dogma is both wrong and dangerous is demonstrable only too frequently.

It is a mistake to try to identify the stages of psychiatric manifestation in sleeping sickness with the three pathological stages of the disease, lymphatico-sanguineous, meningo-encephalitic, and parenchymatous. Psychiatric studies must in each case be related to a wide variety of other investigations and observations including electroencephalography, ventriculography and similar brain studies. Some of these, and the inferences to be drawn from them and their implications, are here considered in some detail.

[See also this *Bulletin*, 1958, v. 55, 133.] *A. R. D. Adams*

Bellelli, L. La castellanosi sperimentale della cavia da *Castellanella evansi*. [**Experimental *Trypanosoma evansi* Infection in Guinea-pigs**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, Oct. & Nov., v. 38, Nos. 10 & 11, 537–52; 576–600, 13 figs. [Numerous refs.] English summary (9 lines).

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Leon, L. A. Leishmanias y leishmaniasis (especialmente en América). [**Leishmaniae and Leishmaniasis, with special reference to America**] 172 pp., 35 figs. [Numerous refs.] 1957. Quito: Editorial Universitaria.

This very full monograph by the Professor of Tropical Medicine in Quito, Ecuador, gives evidence of a vast amount of patient compilation. The author sets out to describe the aetiological, epidemiological and clinical features of leishmanial infections in the Americas and has brought together a great deal of information.

He begins with a history of leishmaniasis and then opens the first part of the study which deals with the cutaneous form. Special attention is given to *Leishmania basiliensis* infection and a very useful list of synonyms is presented. The history of this form is traced through 4 periods and this is followed by a valuable list of workers who have studied it, shown under 14 countries of origin in the Americas. Next, geographical distribution in South and Central America is described and this is followed by an account of the epidemiology. Clinical features are discussed and illustrated at length and 2 tabulated classifications are given: each form is then reviewed separately. Complications, pathology, diagnosis and differential diagnosis are very fully treated, and this part of the work ends with a section on treatment.

The second part deals similarly with visceral leishmaniasis and finally there are a large bibliography and a special index.

Readers of Spanish will find this work a very comprehensive and admirably presented account of the subject.

H. J. O'D. Burke-Gaffney

Bruijning, C. F. A. **Man-Biting Sandflies** (*Phlebotomus*) **in the Endemic Leishmaniasis Area of Surinam.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 229–36, 9 figs. [16 refs.]

Major developments are planned for the interior of Surinam, and this paper is a valuable preliminary report of the *Phlebotomus* biting man in the territory. These are apparently confined to the interior, like cutaneous leishmaniasis which is endemic among bush Negroes. Espundia is rare; there is one case on record of kala azar [this *Bulletin*, 1954, v. 51, 1152]. The 5 species of *Phlebotomus* biting man in the endemic leishmaniasis area include *P. intermedius*, a proven vector of leishmaniasis. Particulars are given of the specimens captured of these 5 species (*P. intermedius*, *P. squamiventris*, *P. arthuri*, *P. guyanensis* and *P. paraensis*). The figures illustrate features of their spermathecae and

buccal cavities. A key is provided to the females of 13 species which bite man and can be expected in Surinam. *D. S. Bertram*

Deane, L. de M. Leishmaniose visceral no Brasil. Estudos sôbre reservatórios e transmissores realizados no Estado do Ceará. [**Visceral Leishmaniasis in Brazil. Study of Reservoirs and Transmitters in the State of Ceará**] 162 pp., 2 maps, 1 graph & 49 figs. 1956. Rio de Janeiro: Serviço Nacional de Educação Sanitária, Brazil.

Readers of this *Bulletin* will be familiar with the large amount of original studies on leishmaniasis published by the author, from the University of São Paulo, and will welcome this admirable monograph embodying much of the author's more recent research.

The present work is divided into 5 parts. After an introduction which reviews general concepts regarding visceral leishmaniasis and its transmission, the first chapter is presented. This deals fully with the history of the disease in Brazil, with very considerable reference to the literature. Chapters 2 and 3 are based on studies respectively of reservoirs and transmitting agents carried out in the north-east of the State of Ceará, principally from 1953 to 1955. The first of them deals with terrain, distribution and the vertebrate hosts man, dog and the fox *Lycalopex vetulus*. The comparative importance of the three hosts is reviewed and a list is given of several other animals investigated. Of these, only dogs (49 of 936) and foxes (4 of 33) were positive. The third chapter deals at length with the insects concerned in transmission, with special reference to *Phlebotomus longipalpis*, although 13 other species were also captured. There is a very full account of the distribution and prevalence of *P. longipalpis* in Ceará, its domiciliary habits, feeding, breeding places, seasonal variation, and natural infection. The possibility of transmission by other species of *Phlebotomus* in the region is considered to be slight, and *P. longipalpis* is incriminated as the sole important agent.

The last chapter contains observations on the transmission of visceral leishmaniasis in Brazil as a whole.

The monograph contains many useful tables, photographs and photomicrographs and no less than 19 pages of references. It is an outstanding contribution to the knowledge of the transmission of visceral leishmaniasis in Brazil. *H. J. O'D. Burke-Gaffney*

Prata, A. Quadro clínico e laboratorial do calazar. [**Clinical and Laboratory Aspects of Kala Azar**] *Arquivos Brasileiros de Med. Naval*. Rio de Janeiro. 1957, Sept., v. 18, No. 65, 5773–6022, 93 figs. [Numerous refs.] English summary.

This lengthy monograph constitutes a thesis presented to the Faculty of Medicine in the University of Bahia, Brazil. In it the author makes

an exhaustive study of 22 cases of kala azar and presents the results in very great detail. The first part is clinical and gives a full account of the manifestations of the disease, with considerable reference to the literature. Each of the body systems and principal organs affected is discussed in turn, and the author's own findings are recorded. The second part gives a full discussion of haematological and serological findings, liver function tests, urine analysis, liver biopsy findings, the methods of finding the parasite and other tests.

The monograph ends with detailed case-notes of all the 22 patients. There is a full English summary amounting to 5 pages, so that with this, and the many tables and illustrations, readers unfamiliar with the Portuguese language will be able to derive considerable information from this very full clinical study. There is a full bibliography of 14 pages.

H. J. O'D. Burke-Gaffney

Prata, A. Cura parasitológica do calazar. [**Parasitological Cure of Kala Azar**] *Hospital.* Rio de Janeiro. 1957, May, v. 51, No. 5, 571–7, 2 figs. [13 refs.] English summary (5 lines).

The author, in Brazil, describes his findings in 13 patients with kala azar who had been treated with glucantime or sometimes with this drug and lomidine or Pentostam [sodium stibogluconate], or with Pentostam alone. The total dose of glucantime for any one patient lay between 45 cc. and 388 cc.; the total dose of lomidine was 18·5 cc. in one patient and 106 cc. in another; the total doses of Pentostam in 2 patients were 19 cc. and 36 cc. respectively. Leishmaniae were found in the bone-marrow in every patient before treatment, but the marrow was negative after treatment in all. On the other hand, liver biopsy made between $1\frac{1}{2}$ and 11 months after treatment revealed the presence of leishmaniae in 11 patients. Despite this finding, all but one of the patients achieved clinical cure.

H. J. O'D. Burke-Gaffney

Sen Gupta, P. C. **Observations on Post-Kala-Azar Dermal Leishmaniasis.** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Jan., v. 8, No. 1, 175–86, 1 chart & 11 figs. [23 refs.]

This study was made on clinical material seen at the Calcutta School of Tropical Medicine. [Probably 90% of the cases of post-kala-azar dermal leishmaniasis ever reported upon have been seen at this institution.] Graphs of the number of cases treated at the School, of kala azar from 1924 to 1954 and of dermal leishmaniasis from 1929 to 1954, show that a sharp rise in the former began in 1944 and in the latter in 1948; this increased incidence in the case of kala azar lasted for 6 years, but in the case of the dermal lesions it had not begun to fall again by 1954 (the last

year shown). An annual attendance which had averaged about 75 between 1929 and 1947 had risen to about four times that figure in 1954.

Analysis of 1,000 cases showed that 83% of patients gave a previous history of kala azar, 13% a history of a febrile attack that subsided without specific treatment, and 4% gave no definite history of fever. The interval between the febrile attack and the first appearance of the dermal lesions was up to 1 year in 26·8%, 1 to 2 years in 19·0%, 2 to 5 years in 32·3% and over 5 years in 13·0%; in 8·9% no accurate history was available.

The 3 main types of lesions are hypopigmented macules, nodules, and an erythematous flush usually distributed characteristically on the face. Except in the case of the hypopigmented lesions, a single type of lesion seldom occurs alone; hypopigmented lesion occurred alone in 20·2% and with other types in 69·4%, the nodular type in 4·8% alone and in 65% with others, and the erythema in 1·1% alone and with others in 46·2%.

For the confirmatory diagnosis of the nodular lesions, sample smears will usually show plenty of leishmaniae, but for the other lesions in which they are scanty the author recommends histological sections stained by iron haematoxylin or by the Feulgen method.

For treatment he recommends the pentavalent antimonials, but a long course of treatment is necessary—up to 5 times the amount given for the visceral infection. He gave 20 to 50 injections, with an overall cure rate of just over 50%; distinctly poorer results were obtained in the hypopigmented type than in the others. *L. E. Napier*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Taylor, R. M., Kingston, J. R. & Rizk, F. **A Note on Typhus in Egypt and the Sudan.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 863–70, 1 fig.

Complement-fixation tests with *Rickettsia prowazeki* antigen on sera collected from inhabitants of the Nile Valley during the period 1951–54 gave the following percentages of positive results: 19·3% of 1,066 sera from Lower Egypt; 13·2% of 234 sera from Upper Egypt; 3·7% of 352 sera from the Southern Sudan. The percentage of positives in specimens collected in Egypt increased from 3% in the 0–4-year age-group to 31% in age-groups above 29 years. Of 50 active or recent cases of typhus, 35

were classed as epidemic and 15 as murine type. 34% of sera from 116 rodents captured in or near Alexandria gave positive reactions, but no positives were found among sera from 146 rodents taken at Barada (about 30 kilometres north of Cairo).

It is thought likely that the endemicity of louse-borne typhus in Egypt is due to recrudescences of the Brill-Zinsser type. The danger of epidemic spread is emphasized; a non-immune population is growing up in a country where *R. prowazeki* is well distributed and where lice have shown signs of developing resistance to DDT. *R. S. F. Hennessey*

Imamaliev, S. A. **Clinical and Epidemiological Characteristics of Endemic (Rat) Exanthematic Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 3, 355–60. [Translated from Russian.]

The author carried out an investigation into the clinical picture and epidemiology of endemic (or murine) typhus in Baku, using hospital patients as his clinical material.

The diagnosis was clinical in the first place; but it was confirmed serologically by the use of specific rickettsial and *Proteus* antigens, and by the isolation of *Rickettsia mooseri* in a few instances.

The clinical severity was classed as mild (42·7%), moderate (50·6%), and severe (6·7%) according to the degree of cardiovascular and nervous involvement.

The average duration of the fever was 10–15 days according to the severity of the attack.

The onset of the disease was rapid in 71·7%, gradual in 20·6% and preceded by prodromal symptoms in 7·7%. The fever reached over 103°F. in most cases. A macular or maculopapular rash appeared on the fifth, sixth or seventh days, and was "typically localized to the palms and soles and sometimes to the face". [It seems possible that there has been a misunderstanding in the translation here; the extension of the rash to the palms, soles and face is a point of differential diagnosis from epidemic typhus, but it is seldom confined to these areas.] The occurrence of a rash was correlated with the severity of the disease; it was always present in the severe forms but absent in about 20% of the rest. Headache was constant, but meningoencephalitis was confined to the severe cases. Of the cases reported upon, 5·7% had had a previous attack of epidemic typhus; in 0·7% of them the attack of murine typhus was classed as severe.

The largest number of cases occurred between August and February with a moderate peak in December. The disease was more common and more severe in women than in men. The incidence was higher in the older parts of the town and around the wharves where there were more rats. In some localities 33% of the rats were infected, but the disease

only occurred after rats were infected with fleas. More than one member of a family were infected in only 10 instances and in their houses infected rats were found.

[The value of this report is limited by the almost complete absence of actual figures; with one exception percentages only are given.]

L. E. Napier

Giroud, P., Colas-Belcour, J., Pfister, R. & Morel, P. *Amblyomma, Hyalomma, Boophilus, Rhipicephalus* d'Afrique sont porteurs d'éléments rickettsiens et néorickettsiens et quelquefois des deux types d'agents. [**African Species of *Amblyomma, Hyalomma, Boophilus* and *Rhipicephalus* are carriers of Rickettsiae and Neorickettsiae and sometimes of both types of Organisms**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 529–32.

The authors examined 14 lots of ticks from various parts of Africa by intraperitoneal inoculation of their contents into guineapigs, or merions, and intranasally into mice. *Rickettsia conori* was isolated from a batch of *Rhipicephalus sanguineus* collected from sheep in the neighbourhood of Niono, French Sudan, and maintained for 7 passages. *Amblyomma variegatum* in one batch from sheep in the Dakar region were found to be infected simultaneously with *R. conori* and *R. burneti*. Typical pathological symptoms developed in the infected rodents and the sera of the animals on which these ticks were collected were positive for boutonneuse fever in 5 out of 13 specimens, and once for Q fever.

In addition 5 strains of neorickettsiae were isolated:—from *Hyalomma transiens* on cattle at Niono; from *Boophilus annulatus* on cattle at Casablanca and from *Hyalomma excavatum* on the same cattle; from *Amblyomma rufipes* on goats in the French Sudan; and from *Boophilus decoloratus* on goats at Dakar.

Edward Hindle

Cioglia, L. & Medda, A. Ricerche sulla febbre Q in provincia di Cagliari. [**Studies on Q Fever in the Province of Cagliari, Italy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, Sept., v. 38, No. 9, 475–83. English summary (9 lines).

The English summary appended to the paper is as follows:—

"The deviation of complement and a precipitation reaction were carried out in the sera of sheep, goats, oxen and horses in order to ascertain the diffusion of Q fever in the province of Cagliari. The two tests proved equally valuable but each of them detected only 70% of the positive reactions obtained when both were employed.

"Positive reactions for at least one of the two tests were obtained in 40·3% of the goat, 50% of the sheep and 10·3% of the oxen sera. In all

the goat herds, but not in all the sheep herds, one animal at least gave positive results."

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, actiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

PANTHIER, R., CARTEAUD, A. J. P. & HUSSON, R. A. Recherche d'une méthode précise de titrage des anticorps par test de séroprotection. II.—Étude de la variation systématique du rapport virus anticorps. [**Investigation of a Precise Method of Titrating Antibody in Neutralization Tests. II. Investigation of Systematic Variation of the Virus-Antibody Ratio**] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 282–95, 4 figs.

The authors have made a quantitative study in mice of the neutralization test with the Dakar strain of yellow fever virus, in which the doses of virus and antibody used were varied over 30,000 and 10,000-fold ranges respectively. The mean reciprocal survival times were plotted against virus and antiserum doses to give a 3-dimensional diagram. The results showed that over certain ranges there was no simple mathematical relationship between the results obtained with varying doses of virus in the presence of a fixed dose of serum, and that ranges of virus dose existed in which a serum of low antibody titre could not be distinguished from a negative one. Some observations were also made on the LD50 and PD50 [50% protective dose] of the virus preparation and antiserum over different dose ranges.

[For previous studies by Panthier, see this *Bulletin*, 1957, v. 54, 561.]

D. J. Bauer

DE RODANICHE, Enid. **Survey of Primates captured in Panamá, R.P. during the Years 1952–1956 for Protective Antibodies against Yellow Fever.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 835–9. [10 refs.]

Between 1937 and 1948 the endemicity of jungle yellow fever in Panama was determined by surveys of the human population resident in rural areas. In recent years, however, extensive vaccination has limited the epidemiological value of such surveys and, in consequence, surveys of forest animals, particularly monkeys, have been substituted. The present article provides the results of mouse protection tests with the sera of primates captured during the 5-year period 1951–1956.

In this period the sera of 395 primates were subjected to the intracerebral mouse protection test. Sera from all but one of Panama's 6 native primate species were collected: 197 squirrel marmosets (*Marikina geoffroyi*), 100 red and black spider monkeys (*Ateles geoffroyi panamensis* and *robustus*), 47 night monkeys (*Aotus zonalis*), 24 whiteface monkeys (*Cebus capucinus*) and 27 howling monkeys (*Alouatta palliata*). Sera from only the 2 first named species yielded positive results: from 12 (6%) of the marmosets and from 9 (9%) of the spider monkeys. Of the monkeys providing these 21 positive sera, 2 derived from the Darien province, 17 from that area of Panama east of the Canal, including the Bayano River Valley and the section extending westward to the Canal Zone, embracing the environs of Pacora, Chepo and Carro Azul, 1 from Panama west of the Canal and 1 from Colon west of the Canal. These positives were obtained, respectively, from 36, 280, 26 and 3 animals submitted for examination from the 4 provinces named.

More detailed analysis of the positive findings showed that 16 of the 21 animals with neutralizing antibodies in their sera gave positive reactions against more than 500 LD50 of virus and at least 11 against more than 1,000. The highly positive tests obtained with blood of a juvenile (non-suckling, more than 6 months old) marmoset and a juvenile black spider monkey, both captured in the Bayano area in 1954, and a juvenile marmoset captured near Pacora in 1955 gave strong indication of continued activity of the virus since the 1948 outbreak [which took origin near the village of Pacora, 18 miles east of Panama City]. In 1956 there was a sharp increase in the percentage of positive animals received from the Bayano River Valley and the contiguous area: 7 (16%) of 44 juvenile spider monkeys gave positive protection tests, with 5 possessing the power to protect against at least 1,000 LD50 of virus; proof was thereby afforded of epizootic activity in what must be recognized as an important enzootic centre. In the same year the serum of one of 3 monkeys—a juvenile marmoset taken in July near Chagres, in the Province of Colon, west of the Canal, on the Atlantic Coast—proved capable of neutralizing more than 500 LD50 of virus. In this connexion it is known that yellow fever was active in this area in 1950 [a 38-year-old Panamanian man, who died on 24 January 1950 in the government hospital in Colon, was the first case of yellow fever in many years known to originate west of the Canal Zone]. The finding now recorded suggests continued virus activity in this area also since the 1948–1951 outbreaks.

G. Stuart

Kerr, J. A. **Yellow Fever Vaccination by Scarification.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 559.

Meers [this *Bulletin*, 1957, v. 54, 1311] considered that the results of yellow fever vaccination by scarification with the 17D strain were highly

satisfactory for raising immunity levels in populations exposed to the risk of epidemic infection. The present correspondent, from Maryland, does not consider that this applies to rural populations in the New World, where the principal hazard is jungle yellow fever, a zoonosis acquired by man through feral mosquitoes such as *Haemagogus*. Under such conditions no herd immunity is produced by 85% of successful immunization; anyone not demonstrably immune must be presumed to be unprotected against the jungle virus.

For 20 years vaccination against yellow fever has been widespread in Colombia. In a well-vaccinated area (San Vicente) neutralizing antibody was found in only 80% of 1,169 human sera. In the first 8 months of 1957 there have been 22 fatal cases of yellow fever in Colombia, proved by viscerotomy, all of them in areas where it is believed that vaccination had been done as well as in the San Vicente area. These data suggest " that yellow fever is finding people before the vaccinators are "; they do not reflect on the immunizing properties of the 17D vaccine used exclusively in Colombia.

While a group immunity to yellow fever of 85% would be reasonably satisfactory in an urban community in houses infested with *Aëdes aegypti* or similar urban vector, the 15% of failures " is a gap that is well worth closing " and studies to this end are envisaged in Colombia. This is not an argument against " scratch vaccine " because nothing seems to be as good as scarification for house-to-house vaccination of rural people living in isolated houses, as is the custom in epizootic and enzootic areas in parts of Latin America. *H. J. O'D. Burke-Gaffney*

RABIES

Sulkin, S. E., Krutzsch, P. H., Wallis, C. & Allen, R. **Role of Brown Fat in Pathogenesis of Rabies in Insectivorous Bats** (*Tadarida b. mexicana*). *Proc. Soc. Exper. Biol. & Med.* 1957, Nov., v. 96, No. 2, 461–4. [25 refs.]

" 1. Studies on the progression of peripherally inoculated rabies virus in Mexican free-tailed bats (*Tadarida b. mexicana*) suggest that the brown (hibernating) fat plays a significant role in the pathogenesis of rabies in this animal. 2. Brown fat may serve as a depot for the storage of virus in symptomless carriers of the rabies virus. 3. These studies provide another example of selective viral lipotropism."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Keppie, J., Smith, H. & Cocking, E. C. **Lethality for Guinea Pigs of Ultrasonic Extracts of *Pasteurella pestis*: its relationship to Death of Guinea Pigs from Plague.** [Correspondence.] *Nature.* 1957, Nov. 23, v. 180, 1136. [12 refs.]

Sterile filtered plasma from guineapigs dying of *Pasteurella pestis* infection had a small but variable toxicity for mice (LD50>1 ml.; 0·1 ml. intravenously) and no detectable toxicity for guineapigs (10 ml. intravenously) although the plasma originally contained 1–3 × 10^9 organisms per ml. Toxicity was absent or minimal if plasma was rapidly cooled and filtered, but increased if unfiltered plasma was stored at 0°C. It seemed unlikely that extracellular toxin was produced *in vivo* by *P. pestis*, and the presence of toxin in organisms collected from guineapigs which had died from *P. pestis* infection was investigated. A filtrate of a suspension containing 10^{10} *P. pestis* per ml. which had been disintegrated by ultrasonic wave treatment had a mouse LD50 (intravenous) of 1/800 ml. and a guineapig LD50 about 3,000 times larger. "On a body-weight basis, the resistance of a guinea pig to this toxic extract is about 250 times that of a mouse." This order of species difference in susceptibility is similar to that found with other toxins. The toxin acted quickly in both mice and guineapigs, deaths occurring mainly within 12 hours.

These results raise doubts as to whether preparations of toxin which were lethal for mice but not for guineapigs did in fact contain the true toxin of *P. pestis* and it is thought that *P. pestis* contains a toxic complex which hitherto has only been isolated in part. With the aid of ultra-sonic waves, it has been possible to separate 2 constituents from *P. pestis* grown *in vivo*, one being a highly toxic soluble material which has very little protective antigen and the other a residue which readily immunizes guineapigs. *R. S. F. Hennessey*

Seal, S. C. **Studies on Immunization against Plague: Application of Qualitative and Quantitative Precipitation and Agglutination Tests in evaluating the Titre of Antiplague Sera.** *Ann. Biochem. & Exper. Med.* Calcutta. 1954, v. 14, Nos. 1/4, 9–24, 3 figs. [29 refs.]

"1. Ordinary agglutination or precipitation titres bear only qualitative relationship with the mouse-protective values of antiplague sera or with the immunity status of an animal under immunization and cannot be depended upon for quantitative evaluation.

"2. A qualitative precipitin nitrogen test developed after Heidelberger and Kendall's technique with the P¾ protein fraction, isolated from the

supernatant of the Haffkine plague vaccine prepared in enriched casein hydrolysate broth, and a quantitative agglutinin nitrogen test carried out according to the Heidelberger and Kabat's technique with a standardized suspension of virulent plague organisms grown in the same broth at 28°C for 72 hours and killed by 0·1% formalin, have been described.

"3. A statistically significant correlation has been found between the precipitin or agglutinin nitrogen values and the mouse-protective doses and between the two nitrogen values themselves. A formula has been deduced from the second degree regression on precipitin N values and another from the linear regression on the agglutinin N values, by which the expected mouse-protective units can be calculated, the former giving a better estimate than the latter. The same can also be obtained from the regression lines themselves.

"4. At least two antigenic components take part in the agglutination reaction, the significance regarding one of which is not yet fully known except that it does not possibly take part in the anti-infective activities.

"5. These quantitative methods permit quick titration of sera of animals for guiding the procedures at different stages of immunization.

"6. A tentative mouse-protective unit has been suggested which may provisionally be used as a basis for working out a method of standardization of antiplague serum.

"7. Rabbits are superior to horses for the production of antiplague serum."

CHOLERA

Gallut, J. Essais d'exaltation du pouvoir toxique de *Vibrio cholerae*. II.—Par dissociation R-S *in vitro*. [**Attempts to enhance the Toxicity of** *Vibrio cholerae*. **II.—By R-S Dissociation** *in vitro*] *Ann. Inst. Pasteur.* 1957, Oct., v. 93, No. 4, 532–6.

To test the possibility that loss of toxicity in stored strains of *Vibrio cholerae* might be due to gradual smooth (S) to rough (R) transformation, suspensions of an Inaba type strain (Vibrio 99) which was to all appearances in the smooth state were treated with guineapig serum (fresh or lyophilized) for 1 hour at 37°C. followed by anti-R immune serum. This mixture was sown on agar immediately in one experiment, and after 16 hours at 20°C. in other experiments. The resulting cultures were harvested after 40 hours at 20°C. and allowed to autolyse in isotonic 0·5% glucose solution for 24 hours. Autolysates obtained by these means showed increased toxicity for mice when compared with autolysates of the untreated strain, the mean increase of toxicity in 5 experiments being 2·57-fold. Storage of Vibrio 99 in peptone water for about 3 months led

to progressive loss of toxicity, while treatment of a suspension with anti-S instead of anti-R serum also reduced toxicity.

It is concluded that the rise in toxicity after treatment with guineapig serum and anti-R serum was due to elimination of R forms. Nevertheless, the strain was not restored to its original toxicity by these means, which appeared only to retard the progressive loss of toxicity which occurs during storage.

[For Part I see this *Bulletin*, 1957, v. 54, 1411.]

R. S. F. Hennessey

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order: epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

CROSNIER. De l'amibiase exotique à l'amibiase métropolitaine. Les variantes de pathogénicité de l'amibe. [**Exotic and Metropolitan Amoebiasis. Factors affecting the Varying Pathogenicity of the Amoeba**] *Bull. Acad. Nat. Méd.* 1957, v. 141, Nos. 24/25, 529–35.

There is no uniformity in the clinical picture of tropical amoebiasis, though the causal organism is common to it in all its clinical forms. The pathogenicity of strains or races of parasites differs; associated bacterial flora and associated parasites influence the amoebic infection; and the geographical locality of acquirement and the diet and nutritional defects also do so. African and Asian amoebiasis are very different in their manifestations, that from the Far East being a particularly serious condition. Infections from certain localities, for example North Africa, also have their peculiarities. In metropolitan France clinical amoebiasis likewise varies with a number of factors. It may be the result of a true autochthonous infection, in which case the clinical syndrome is usually mild. But it may be the result of infection with a strain of parasite recently imported from abroad, or with a strain of exotic origin after passage through one or two other indigenous patients. Furthermore clinical amoebiasis may be the result of superimposition of an exotic strain on an existing autochthonous one, with potentiation of the pathogenicity of the former. The matter is further complicated by the variations in susceptibility of different persons to their parasites.

In comment Prof. GALLIARD said he found it difficult to classify clinical amoebiasis by its country of origin. Amoebiasis and the bacterial diseases in Indo-China fluctuated in severity with the conditions obtaining during

the war there. Rapid transference of the infections, as a result of overcrowding in the presence of exhaustion and malnutrition, resulted in exaltation of their virulence. He thought that, using the term correctly, " autochthonous " amoebiasis could not be said ever to have occurred in France. In all cases an exotic source of the infection could be traced. Both the First and the Second World Wars had ensured an admixture of fresh peoples and their parasites. Examination of 1,500 people of all classes of society and background, not drawn from one source, had revealed that 5 in 100 of them harboured *Entamoeba histolytica*. Enquiry showed that each infected person had at some time stayed in regions of amoebiasis endemicity; they could not therefore be said to have autochthonous infections. *A. R. D. Adams*

Shafei, A. Z. **The Comparative Efficiency of some Quinoline Compounds used alone or in combination with Sulphonamides in the Treatment of Amoebic Dysentery.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 5, 296–307. [40 refs.]

149 patients with proven intestinal amoebiasis and either past or present symptoms due to it were divided into 6 groups. One (64) was treated with di-iodohydroxyquinoline, another (15) with chiniofon, another (10) with this drug plus chloroquine, another (20) with Resotren, another (20) with Resotren plus Supronal (a combination of sulphamerazine and Marbadal), and the last (20) with di-iodohydroxyquinoline plus chloroquine plus phthalyl sulphathiazole. All the drugs were given orally, and the observations on the patients were continued for 3 months. The data are set out in a table, and for comparison there is another similar table showing the results of treatment of 146 patients with various antibiotics.

The author from a study of his data concludes as follows:—

" In the author's experience, newer antiamoebic agents including several antibiotics, appear to be no more successful than quinoline compounds. 90% of cases, at most, are cleared of amoebic infections when combinations of antibiotics were used. When single antibiotics were used alone, the relapse rate varied from 50 to 16·6 per cent.

" Owing to the high cost of these agents, the hazards of broad spectrum antibiotics, and to the relatively high relapse rate, halogenated quinoline compounds still have their place in the treatment of intestinal amoebiasis. The fact that they belong to the group of contact amoebicides, the minimal toxic effects, and the possibility of their use for prolonged periods without untoward effects, indicate their use.

" The addition of a tissue amoebicide as chloroquine and a bacteriostatic agent as sulphonamides potentiates the action of halogenated quinoline compounds, and diminishes the relapse rate in intestinal amoebiasis."

A. R. D. Adams

Beppler, W. A. & Schweiger, L. B. **Amebicidal and Trypanocidal Activity of a New Series of Diamines.** *Antibiotics & Chemotherapy.* New York. 1957, Oct., v. 7, No. 10, 513–20.

During the present investigation in which the amoebicidal and trypanocidal activities of symmetrical diamines were tested, cultures of *E. histolytica* in association with *T. cruzi*, as described by Phillips [this *Bulletin*, 1950, v. 47, 624; 741], were used. Drugs were incorporated as described by Bradner and Rawson [*ibid.*, 1951, v. 48, 990]. A check for activity of these drugs against *T. cruzi* was also made. When amoebae appeared to be absent as a result of drug treatment inoculations were made into fresh medium for confirmation. Tests with diphasic medium under standardized conditions were also carried out in which *E. histolytica* was accompanied by a single bacterium.

In all, 26 drugs were tested and their chemical composition is outlined in a table. For comparative purposes emetine, 3 synthetic amoebicides and fumagillin were used at the same time. The results obtained in the amoeba-trypanosome test were more favourable than with the other. Two compounds designated MA 268 (N,N'-dipiperonyl-5,10-diaminotetradecane.2HCl) and MA 307 (N,N'-dipiperonyl-5,11-diaminopentadecane. 2HCl) possessed anti-amoebic activity approaching that of emetine. A number of amines tested were also active against the culture forms of *T. cruzi*. The author is of the opinion that this group of substances is worthy of further study. *J. D. Fulton*

Popli, S. P. & Mukerji, B. **Chemotherapeutic Search for Amoebicides.** *J. Sci. & Indust. Res.* New Delhi. 1957, Oct., v. 16A, No. 10, 440–50. [109 refs.]

A general review and discussion.

Kennedy, C. C. & Stewart, R. C. **Balantidial Dysentery: a Human Case in Northern Ireland.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 549–58. [46 refs.]

It is claimed that the subject of this paper is only the third case of balantidial dysentery to be described in the British Isles [this *Bulletin*, 1939, v. 36, 599; 1943, v. 40, (313)]. Despite man's close contact with pigs in many countries, balantidial dysentery is still a rare disease.

A male child, aged 5 years, was seen in a Belfast hospital in April 1950. He was small, anaemic and wasted. His protuberant abdomen suggested the diagnosis of coeliac disease. After various vicissitudes he was admitted to Belfast City Hospital and finally on September 8, 1954, *Balantidium coli* was recognized in the faeces after several sigmoidoscopic examinations had proved negative. Eggs of *Trichuris trichiura* were also

present. Some 8 days later encysted forms of *Balantidium coli* were present. This is a rare finding in man.

The balantidial infection in this case was almost certainly contracted in the unhygienic surroundings of his home. Sanitation was primitive and the latrine accommodation consisted of one bucket (for 2 adults and 5 children) and the excrement was buried in the garden. The living-room was filthy and full of flies. Ten yards away across the street were 12 pigs in three pens and the boy frequently helped to clean them out. The faeces of these animals showed vegetative and cystic forms of *Balantidium coli* and moreover trophozoites were found in the dirt in the street.

The patient had never been well and suffered from pica. He was well known as a dirt eater and on many occasions he was chastized for eating dirt from the street with a spoon.

Many forms of treatment were tried, first with piperazine and then with fumagillin, but without any ascertainable result. After recovery from the effects of this antibiotic Stovarsol [acetarsol] was chosen on account of favourable reports in the literature. 2 gm. of this drug thrice daily (6 gm.) was maintained for 5 days. After this intensive course no further trophozoites or cysts were recognized. Benzidine tests for occult blood have remained negative and the child's general condition has greatly improved. The haemoglobin level has risen to 90%. The weight has increased to 60 lb. The eosinophilia is, however, still present and the *T. trichiura* infection is unaffected.

Up to the present the incidence of balantidial infection in domestic pigs in the British Isles does not seem to have been reported. The authors obtained material from the caeca of healthy pigs after slaughter in the Belfast abattoir. Out of 100, 74 were infected with *Balantidium coli*; 40 showed trophozoites only; cysts were found alone in 12, while both trophozoites and cysts were present in 22. *Philip Manson-Bahr*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Lipparoni, E. Indagini sulle zecche della zona del medio Uebi-Scebeli. [**Observations on Ticks from Middle Uebi-Scebeli, Somalia**] *Nuovi Ann. d'Igiene e Microbiol.* 1957, Sept.–Oct., v. 8, No. 5, 512–18, 1 map. [16 refs.] English summary.

Several species of ixodid tick are reported from an inland region of former Italian Somaliland, and also *Ornithodorus savignyi* from houses and prisons of the township of Itala on the coast. A host list is given for the ixodids. There is a general statement which seems to say that *O. savignyi* was transmitting relapsing fever among police and prisoners

in the gaols of Itala. No proof is, however, given nor is reference made in this connexion to *O. moubata* which is also known in this territory.

D. S. Bertram

YAWS AND OTHER TREPONEMATOSES

TALLACK, R. J. K. **Epidemiology of Yaws in Zanzibar and Pemba.** *East African Med. J.* 1957, Oct., v. 34, No. 10, 533–43, 2 figs.

Zanzibar and Pemba are the two principal islands of a group of coralline islands comprising the Protectorate of Zanzibar. The climate is warm and humid, similar to that of those areas of the world in which the prevalence of yaws is highest. The 1948 census gave the population of Zanzibar as 149,575, 79·3% Africans, 9·3% Arabs, 8·8% Indians, 2·6% others, and of Pemba as 114,587, 70·9% Africans, 26·7% Arabs, 1·8% Indians, 0·6% others.

In the two years 1953 and 1954 4,806 patients with yaws attended the clinics of Zanzibar and 15,319 those of Pemba. It was not possible to stratify these figures by age-groups, nor to relate prevalence to climatic differences. Nor could incidence according to race be differentiated statistically, but the author after 9 years' experience states that the greatest prevalence is among Africans and rural Arabs, people of low economic status living in insanitary conditions.

The higher incidence in Pemba is explained by the facts that a higher proportion of its population is rural compared with that of Zanzibar, and that Pemba, the great clove growing area, attracts thousands of immigrant casual labourers annually. Minor abrasions of the skin surface of the pickers are very common.

B. B. Waddy

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BEISSÈGE, H., CHAMBON, L. & NGUYEN-VAN-AÏ. Lèpre lépromateuse traitée par la D-cyclosérine synthétique. Résultats après cinq mois de traitement. [**Lepromatous Leprosy treated with Synthetic D-cycloserine. Results after Five Months of Treatment**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1957, Nos. 25/26, 807–12.

Stimulated by results obtained in pulmonary tuberculosis with D-cycloserine, the authors have been treating certain patients with early

acute lepromatous leprosy with this product, and in this paper submit the results obtained in one patient after 5 months' treatment.

Three periods of treatment are described. From May 27 to July 7 the dosage was raised from 1 capsule (0·25 gm.) per day to 3 capsules [total 19·25 gm.]. This was followed by swelling of the lesions and a leonine appearance of the face, but no rise of temperature. For the next 2 weeks 1·0 gm. per day was given combined with an antihistamine, and this resulted after 10 days in a violent reaction in both skin and nerves, making it necessary to diminish dosage. Thereafter during the final 2 weeks, the dose was reduced first to 0·75 gm. and then 0·50 gm. daily; and along with this was given phenylbutazone, 300 mgm. per day for 3 weeks, 200 mgm. for 2 weeks and 100 mgm. for 2 weeks. During this last period the swelling of lesions and other signs of reaction disappeared. The signs of clinical improvement were paralleled by bacteriological improvement, and histological examination showed regression of leproma.

An oral communication from Dr. Pennec of Guadeloupe is quoted as saying that cycloserine is capable of producing further improvement in severe lepromatous patients who have ceased to improve under sulphone treatment. If these results are confirmed we shall have another important addition to our present means of treating leprosy. *Ernest Muir*

Nakagawa, Y. & Nakamura, M. **Preservation of *Myc. lepraemurium* by means of Lyophilization. II Report.** *Kurume Med. J.* 1957, v. 4, No. 2, 69–74, 4 figs.

"Myc. lepraemurium lyophilized in the saline solution, serum water, Kirchner's medium, and glycerine water were storaged in a refrigerator for about five years and five months and then the infectious activity of the bacilli were determined by inoculation of the materials into normal white rats. The results obtained indicated that the infectious activity of the bacilli in these solutions with the exception of glycerine water was still maintained." [See this *Bulletin*, 1955, v. 52, 1100.]

Nishimura, S. **The Significance of Experimental Murine Leprosy and Screening Test in Studies on Chemotherapeutic Agents for Leprosy.** *Med. J. Osaka Univ.* 1957, Mar., v. 7, No. 4, 753–76, 9 figs. [102 refs.]

The author reviews the evidence for using *Myco. lepraemurium* as a test organism for forecasting the antileprotic activity of drugs in human leprosy, and he concludes that its use for this purpose is a mistake; nevertheless the experiments are useful because if a drug can be discovered which is effective in both murine and human leprosy the experiments would serve as a basis for investigating the mechanisms of the drug's action.

From the brief review of the bacteriology of human and murine leprosy the conclusion is reached that little is known of this aspect of the diseases, especially as regards metabolism relative to the growth of these two organisms. The pathology of the two diseases is compared and it is apparent that although they have much in common there are some important differences, *e.g.*, *Myco. leprae* grows in both mesodermal and ectodermal cells whereas *Myco. lepraemurium* proliferates only in the mesenchymal cells of the mesoderm.

A review of the literature concerned with the action of chemotherapeutic drugs in murine leprosy shows that only isoniazid and chaulmoogra oil have consistently shown activity. When the activities of all the drugs for this disease, human leprosy and tuberculosis, are considered only those which have weak activity against the tubercle bacillus, except TB1/698 [thiacetazone], are seen to be active in human leprosy, and none of these are active in murine leprosy; thiacetazone is active in tuberculosis and human leprosy but not in murine leprosy. The fact that so many drugs are active against the tubercle bacillus and yet so few are active against the human and murine leprosy bacilli, suggests that the metabolic processes of the tubercle bacillus are the more complex.

The author finally discusses at some length the various methods of using murine leprosy for screening drugs, and he argues that the method that he uses, *i.e.*, the subcutaneous injection of the bacilli of the Hawaiian strain into 15 gm. mice of the NA1 or NA2 strains, and measuring the spread of the leproma every 15 days for 3 months, is the best. *S. R. M. Bushby*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Bhaskaran, T. R., Roy, B. K. G., Sampathkumaran, M. A., Radhakrishnan, I. & Mukherjee, D. B. **Studies on the Survival of Pathogens in Nightsoil Compost.** *Indian J. Agric. Sci.* 1957, Mar., v. 27, Pt. 1, 91–102, 2 figs.

Composting of nightsoil is being adopted widely in India. This paper reports an investigation into the effect of the Bangalore process on pathogenic intestinal organisms and the eggs of intestinal helminths, particularly *Ascaris*, *Trichuris* and hookworms. Samples were obtained from various States at intervals during treatment and from experimental

pits constructed to provide data under controlled conditions. The investigations comprised estimations of the moisture, carbon and nitrogen contents, the presence of helminth ova on microscopical examination and their viability, and the presence of *Salmonella* and *Shigella* organisms on culture. The techniques employed are described and the results obtained are set out in a series of tables.

In the samples obtained from various state composting installations the counts of ova varied but were always low. No *Salmonella* or *Shigella* organisms were recovered after composting. The moisture and nitrogen contents of the composts varied considerably. In nightsoil composts from the experimental pits the number of helminth ova was considerably reduced within a month of commencement of treatment and they were scanty or absent from about the third month. During composting the temperature rose to 40°C. and remained around that figure for 10 to 15 days. The authors conclude that the sanitary efficiency of composting depends on sanitary supervision and the maintenance of a suitable temperature during manufacture. [These results are less satisfactory than those obtained in China by Scott (*Bull. Hyg.*, 1953, v. 28, 389), who reported temperatures from 60° to 70°C. in nightsoil compost and the complete destruction of *Ascaris* ova in 35 days.] *T. H. Davey*

Watson, J. M. **The Effect of Water Movement on Populations of *Bulinus truncatus*.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 5, 308–24. [30 refs.]

"An account is given of some observations concerning the effect of various forms of water movement—wave motion, current and floods—upon *Bulinus truncatus* in the Middle East; and the literature dealing with this subject is reviewed. It is concluded that severe wave-action, particularly on a steeply shelving shore-line, is inimical to this species. Breeding colonies do not appear to be established in continuously flowing water with a speed of more than 15 metres per minute; but quiet bays and corners may provide opportunities for colonization, especially since water at the sides of a stream or irrigation channel may be flowing more slowly than that in the middle. Records of this species from fast-flowing water require re-investigation. Insufficient evidence is available to permit any judgment regarding limiting speeds and times of intermittently flowing water. Water which is flowing too rapidly for colonization may nevertheless be an important agent for the dissemination of snails floating or clinging to floating débris. Floods are destructive to *B. truncatus*, in part owing to the abrasive action of suspended mineral particles, in part owing to the mechanical action of the rapidly flowing water in interfering with the movements and activities of the snails and in sweeping them away, in part owing to the sudden drop in water temperature which often accompanies sudden flood peaks, and in part owing to interference with the settled conditions of the habitat. The effect of floods upon the

seasonal rhythm of *B. truncatus* in different parts of its geographical range is noted. More information on all of these points and also upon the effect of turbulence is needed."

Scott, J. A. **Egg Counts as Estimates of Intensity of Infection with *Schistosoma haematobium*.** *Texas Reports on Biol. & Med.* 1957, v. 15, No. 3, 425–30.

"Several urine specimens were collected each day for several days from each of 28 young men infected with *Schistosoma haematobium*. The egg content of the specimens was estimated by egg counts and the variability between specimens determined. Quantitative estimates of the average intensity of infection in groups of people seem warranted although more studies of this type are recommended." [See this *Bulletin*, 1957, v. 54, 705.]

Hervé, P. A., Piganiol, G. & Teyssandier. Les complications génitales de la bilharziose urinaire chez l'homme. [**Genital Complications of Urinary Schistosomiasis**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 567–73.

In 7 out of 100 cases of schistosomiasis the authors diagnosed schistosomal urethritis. An equal number were classified as orchiepididymitis and also of spermatocystitis. There were 2 cases of prostatitis.

Philip Manson-Bahr

van Beukering, J. A. **Treatment of Schistosomiasis caused by *S. haematobium*.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 259–60.

In a search for a more suitable injectable drug for the treatment of *Schistosoma haematobium* infection, the author treated 10 (presumably African) in-patients having ova in the urine with sodium antimonyl gluconate (Triostam) intravenously in a daily dose of 225 mgm. for 5 to 17 days. In one patient treatment was discontinued because of dermatitis "doubtlessly caused by the drug". In the other 9, the urinary sediment was free from ova in 7 to 11 days, except in one where the recorded period is 25 days. As the patients were discharged after completion of the course, it is not known whether the results were lasting.

H. J. O'D. Burke-Gaffney

El-Gindy, M. S. **Laboratory Studies on the Effect of Copper Sulphate on *Biomphalaria boissyi*, the Snail Vector of Mansoni Schistosomiasis in Egypt.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 1, 45–53.

Experiments were performed to investigate the effects of copper sulphate upon *Biomphalaria boissyi* under differing conditions of time of exposure, temperature, and mineral content of the water. Investigation

was also made concerning the comparative susceptibility to copper sulphate of snails infected with schistosomes and uninfected snails, and concerning the possible development of resistance to the chemical in those snails that had once been exposed but had recovered.

Groups of snails were exposed to concentrations of 5, 10, 15, 20, 25, and 30 p.p.m. copper sulphate in clear Nile water. Each group contained 3 sub-groups each of 20 snails exposed to different temperature ranges and to different exposure times. A control group without copper sulphate accompanied each sub-group. The exposure times were 2, 4, 5, 8 and 24 hours. Snails left alive at the end of exposure times were washed and the numbers that survived after 4 days were compared with the numbers of control survivors. It was observed that increase in temperature directly affected the toxicity of the chemical as did increase in concentration. Those snails surviving 5 p.p.m. reproduced, but those surviving higher concentration did not. When in another experiment the clear Nile water was replaced by cloudy flood water containing 10 p.p.m. copper sulphate, 85% of the snails survived compared with 13% in city water. [No mention is made about whether the city water was chlorinated. Also, while it was observed that the blue coloration lasted longer in clear water, no suggestion is offered as to why this should be so.]

After a 3-hour exposure of infected and uninfected snails to 10 p.p.m. copper sulphate, 63% of 300 healthy snails survived at 12 days compared with 38% of 50 infected snails. Snails surviving 10 p.p.m. copper sulphate for 3 hours were resubjected to its action 15 days later. Since 33% of 79 re-treated snails and 28% of 100 snails treated once survived at 8 days from exposure it is claimed that the re-treated snails had developed resistance to copper sulphate. Similar though rather higher rates of survival were obtained in another experiment when flood water was substituted for clear water. [The numbers of snails are too small and the relative survival rates too close to make this claim convincing.]

O. D. Standen

El-Gindy, M. S. **Field Studies on the Action of Copper Sulphate as a Molluscocide for Control of the Snail Vectors of Schistosomiasis in Egypt.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 2, 111–21. [12 refs.]

Three methods of water-treatment with copper sulphate are described: the closed method where small canals with all outlets blocked are filled with water to vegetation level and then treated with copper sulphate in sacks dragged through the length of the canals until a concentration of 15–20 p.p.m. is obtained; the shore method where $CuSO_4$ in sacks is dragged through the shallow water at the sides of large feeder canals until 4 kgm. of salt is dissolved in each 50-metre length; the continuous feeding method where $CuSO_4$ is fed continuously at the intake of canals. The efficiency of the closed and shore methods was investigated by

enclosing groups of 20 snails, either *Bulinus truncatus* or *Biomphalaria boissyi* in galvanized wire or celluloid baskets which were immersed in the experimental canals. The baskets were removed after different time intervals, the snails were marked and then kept in fresh water for 3 days before survival rates were estimated. It was found that *B. truncatus* was more susceptible to $CuSO_4$ than *B. boissyi*; that the closed method was very effective but that in the shore method variability in effect occurred according to the position of the snails in the stream. Upstream snails were least affected, snails in the middle length were moderately affected while the greatest effect was observed on snails in the down-stream portions.

A 12-kilometre canal was surveyed for *B. truncatus* before the continuous feeding method was applied. Copper sulphate was dissolved at the intake to provide an estimated 10 p.p.m. Sacks of the salt were partially immersed at the intake and replaced as the contents dissolved; 500 kgm. of salt were dissolved in the canal, 13·2 metres wide, 1·11 metres in average depth and with a flow of 0·11 metres per second. Colorimetric estimation of $CuSO_4$ content of the water was made at 1 km. intervals up to 28 hours after commencement of the experiment. Follow-up surveys by the dip method were made 2 and 3 days after treatment and again after 1, 2 and 3 months. A marked reduction in snail population was observed at the immediate survey and no infected snails were found. Snail infestation increased progressively up to the 3-month period when collections of uninfected snails were 125, 121 and 93 for the 1-, 2-, and 3-month surveys respectively, compared with 407 for the preliminary survey. Re-infestation was due to breeding from surviving snails and repopulation from a heavily infested feeder canal. Although some infected snails were found at the 1- and 2-month survey, none were found at 3 months. *O. D. Standen*

Fraga de Azevedo, J., de Medeiros, Lídia do Carmo M. & da Costa Faro, Manuel Monteiro. Estudos, ensaios e documentos. XXXI. Os moluscos de água doce do Ultramar Português. II—Moluscos do Sul do Save (Moçambique). [**The Freshwater Molluscs of Portuguese Territories Overseas. II—Molluscs of South Save, Mozambique**] 116 pp., numerous illustrations. 1957. Lisbon: Ministério do Ultramar, Junta de Investigações do Ultramar, Portugal.

This volume, the second of a series on the freshwater mollusca of the Portuguese overseas provinces, is concerned with those species from the territory south of the Rio Save (Sabi) in Mozambique. In it are described 15 of a total of 28 species recorded from that region. The authors stress that it is not intended to be a definitive work and that it is based only on collections from part of the territory made in the months of September to November 1952.

The section dealing with taxonomic characters in the first part of the book is largely a repetition of the same section in the first volume. The importance of expressing numerically certain conchological relationships is stressed. A number of these relationships have been in use for some time; the authors advocate the introduction of others which seem to be of little value since they are only of use at generic or species-group levels, separations which can usually be made quite readily without resorting to measurement.

The guide to the anatomy of prosobranch snails which is included in the first part will prove useful to workers concerned with these forms.

A key for the separation of all the species described in the volume is provided and it is certainly easy to use for those who are already familiar with the groups concerned. Whether or not it will prove useful to field workers who may be without the necessary prior knowledge is difficult to assess.

The actual descriptions of the species are made in great detail in the hope that they will provide information which will be useful in future works. The only criticism which might be made here is that the shell dimensions given are, in most cases, the means of only 5 specimens. In the case of the 2 most common species of medical importance, *Biomphalaria pfeifferi* and *Bulinus globosus*, this deficiency is made up by the provision of many frequency curves of shell dimensions and relations in a special section on biometry.

There is a long section on the ecology of the various types of habitats in which the collections were made. Here, also, a mass of information is provided in the hope that it may be of use in the future.

The book is lavishly illustrated with 39 plates of good line drawings of shells and anatomy, also many small maps illustrating geological and climatological characters of the territory and a number of habitat photographs. These photographs are a great improvement on those published in the first volume.

From the bibliography it appears that few of the original descriptions of the species dealt with have been consulted and it is a pity that references are not given to many of the authorities quoted in the table of species recorded from the territory. *C. A. Wright*

Paraense, W. L. & Deslandes, N. *Australorbis nigricans* **as the Transmitter of Schistosomiasis in Santos, State of São Paulo.** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Jan., v. 8, No. 1, 235–45, 16 figs. [14 refs.]

The authors review the conflicting opinions concerning the identity of the planorbid found in the city of Santos, São Paulo, Brazil, and describe their own findings based on shell shape, internal anatomy and cross-breeding experiments. The two main shell-types found in the area are

those described as biconcave and planoconcave, but all degrees of intergrades between the two forms were also present. Morphologically the biconcave types were indistinguishable from *Australorbis nigricans* found in Itajubá [this *Bulletin*, 1956, v. 53, 208 *bis*]. Some anatomical variation was found in the planoconcave types on dissection but both were characterized by the absence of a renal ridge which placed them in uniformity with *A. nigricans*.

Cross-breeding experiments to determine conspecificity were carried out by the method described by Paraense (1955), Paraense and Deslandes [*ibid.*, 1956, v. 53, 1132] where pigmented individuals possessing the extremes of variation in shell shape were crossed with albino *A. glabratus* from Santa Luzia. In each instance the cross resulted in pigmented offspring in both the F_1 and F_2 generations, the absence of albino individuals in the F_2 indicating that no cross-fertilization occurred. The same pigmented specimens used in this experiment were then crossed with albino *A. nigricans* from Itajubá. While the F_1 generation produced the dominant pigmentation, the recessive albinism appeared in about 25% of the F_2 generation, showing that cross-fertilization had occurred. From these results it is concluded that both planorbid forms belong to *A. nigricans*.

Infection with *Schistosoma mansoni* was determined in 0·10% of specimens of the planoconcave type. Attempts at cross-breeding of these infected snails with albino *A. glabratus* failed to produce hybridization. When crossed with albino *A. nigricans* the latter produced pigmented offspring in the F_1 generation. Thus the conspecificity of the infected specimens with *A. nigricans* was established. It is considered of interest that *A. nigricans* has never before been shown to be susceptible to infection with *S. mansoni* but it is admitted that so far, only the planoconcave forms have shown susceptibility. Previous work reported from this area is discussed and it is concluded that the experimental approach has cleared much of the confusion of identity that existed previously. *O. D. Standen*

Prata, A., Medrado, J., Fiore, S. & Alessandri, M. **Specificity of the Intradermal Reaction for the Diagnosis of Schistosomiasis, with Antigens from Adult Worm.** *Bol. Fundação Gonçalo Moniz*. Bahia. 1956, Jan., No. 8, 7–13. [16 refs.]

At the authors' laboratory in Bahia, Brazil, an antigen prepared from adult worms is used as a routine test for the diagnosis of schistosomiasis. In 1952, an Italian training ship called at Bahia and the intradermal reaction was carried out on 155 of the white personnel.

The antigen used was prepared from adult *Schistosoma mansoni* according to Mayer and Pifano's technique [this *Bulletin*, 1950, v. 47, 762], and 0·02 ml. was injected intradermally on the flexor surface of the

forearm. The reading, which was made 15 minutes after the injection, was negative in 152 people, doubtful in 1 and positive in 2. "In the two positive cases the intradermal was immediately repeated in the other forearm with identical results. Feces examinations were made in the three cases and in two were found ova of Ancylostoma duodenale. In neither one were there symptoms of schistosomiasis." One of the 2 positive results was in an allergic person, who said he gave a positive reaction to all forms of intradermal injection. As regards the remaining positive case, there seems no obvious explanation, but the authors suggest that the patient may have been sensitive to the coca solution used in the preparation of the antigen. *R. M. Gordon*

Klock, J. W., Gerhardt, C. E., Ildefonso, V. & Mateo Serrano, J. **Characteristics of Sodium Pentachlorophenate used against** *Australorbis glabratus* **in Puerto Rico.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 6, 1189–1201, 7 figs.

This article is a study of factors affecting the use of sodium pentachlorophenate, particularly in regard to its dispersion and biological effectiveness at various dosage levels when applied to the breeding places of *Australorbis glabratus* in Puerto Rico. Laboratory observations show that every snail was eventually killed in concentrations of 2 parts per million but below that figure mortality was not complete. Experiments on the reaction of snails showed that in concentrations up to 5 parts per million the snails became hyperactive and a proportion tried to escape from the water. Expulsion of air, secretion of mucus and settlement to the bottom were also signs of irritation which were shown by all snails at 5 to 20 parts per million of the chemical. In order to ensure 100% mortality ova required to be exposed for longer than, but less than twice, the time required for adults.

Field tests were carried out by applying various concentrations of sodium pentachlorophenate to streams which were grouped in 3 categories: (1) with little or no ponded water, *e.g.*, canals and earth channels; (2) streams with some obstruction to flow but no large pools, discharge generally not below 0·08 cusecs; (3) a connected series of pools with a flow of 0·1 cusecs or less. With high concentrations it was found that the distance of effective treatment varied with the quantity of ponded water, as did also the rapidity with which the molluscicide passed a point and the amount of molluscicide lost. In type 3 streams molluscicide could be detected for 500 to 1,000 feet below the application point, whereas in type 1 channels the chemical was recovered at distances up to 6,000 feet. At lower dosages effective concentrations spread further downstream and persisted longer. Reinfestation resulted from the survival of ova after poisoning rather than from emergence of snails. Two treatments at 3 to 4 weeks' interval probably would prevent reinfestation from this source.

Solid sodium pentachlorophenate was found to dissolve quite rapidly, but because of variations in rates of solution it was considered impractical to use the solid chemical for treating flowing water. Briquettes were tested and it was concluded that they would prove effective in pools where the water was retained for at least 24 hours. The molluscicide can also be applied by spraying, and an effective application was found to be 1·5 gm. per square yard at a concentration of 12·5%. It was found that sodium pentachlorophenate can penetrate through the shell and kill the snail. It had no residual effect.

This is a selection of the findings of this important investigation which is an attempt to provide basic data on which the performance of sodium pentachlorophenate in natural conditions can be predicted. The paper should be read in full by persons proposing to use molluscicides.

T. H. Davey

Dupont, V., Bernard, E., Soubrane, J., Hallé, B. & Richir, C. Bilharziose à *Schistosoma japonicum* à forme hépato-splénique révélée par une grande hématémèse. [**Hepato-Splenic Form of *Schistosoma japonicum* Infection presenting with a Large Haematemesis**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1957, Nos. 27/28, 933–41. [14 refs.]

Report of a case.

Khoo Oon Teik. **Pulmonary Paragonimiasis. A Clinical Study of Nine Cases seen in Singapore.** *Proc. Alumni Ass., Malaya.* 1957, Sept., v. 10, No. 3, 189–210, 13 figs. [21 refs.]

The present series of 9 cases of paragonimiasis represents the first cases reported in man in Malaya, but the history elicited suggests that the infection took place in Japan. All the patients, with one exception, had eaten raw crab in Japan.

The clinical features were, in order of frequency, haemoptysis, cough, loss of weight, dyspnoea, chest pain, and retrosternal discomfort. In 6 out of 9 patients, physical examination proved normal, although X-ray films disclosed patchy infiltration, pleural effusions, cysts or cavities. An eosinophilia from 12 to 28% was found in 8. The erythrocyte sedimentation rate was generally raised, but appeared to bear no relation to the severity of the pulmonary condition. It was generally higher in those with emaciation. Diagnosis is difficult unless the eggs are demonstrated microscopically.

The various species of *Paragonimus* differ in morphology and behave differently during developmental stages. *P. kellicotti* in North and South America is found in domestic animals and also in the mink in the North. One case of human infection has been reported by Strong in 1944 [this

Bulletin, 1945, v. 42, 421]. In Malaya this species has been found only in the tiger. The other Malayan species, *P. macacae*, has been found in the crab-eating monkey. The two Malayan species belong to the *westermani-kellicotti* group and not to the *compactus* group. It is a matter of speculation whether the life-history of the Malayan species approximates that of *P. kellicotti* of America, or that of *P. westermani* of East Asia in which man is one of the definitive hosts. *P. ringeri* of Formosa, Chekiang, Korea and Japan is found in domestic and wild felines, such as the tiger, leopard, civet cat, in the crab-eating mongoose, dog and house rats (*Rattus rattus* and *R. norvegicus*). It is significant that Sandosham has found that local melanid snails were readily invaded by miracidia hatched out from eggs of *Paragonimus* obtained from the sputa of the patients in this series.

Full rates are given on all 9 patients. *Philip Manson-Bahr*

Rainaut, J. & Larivière, M. Etat de mal épileptique chez un sujet atteint de cysticercose sous-cutanée. [**Epileptic Episode in a Patient with Subcutaneous Cysticercosis**] *Bull. Méd. de l'A.O.F.* Dakar. 1957, July–Sept., v. 2, No. 3, 325–8.

Krueger, Margret. Bandwurmkuren in Südpersien. [**Tapeworm Cures in South Persia**] *Med. Klin.* 1957, Nov. 8, v. 52, No. 45, 1975–6.

The author, working at Bahramabad, found by stool examinations that 80 to 90% of the local people were infected chiefly with *Ascaris*. 40 to 50% of these infections could be cured with oil of chenopodium, ascaridole or santonin, the infections of others being only partially cured by these remedies. But she also found that there were *Taenia* eggs and proglottids in the faeces. She briefly notes the variable distribution of tapeworm infections in different parts of Iran, where these are usually treated with *Filix mas* or Filmaronöl. Relapses are the rule and it seems, in spite of the report by Wigand and Warnecke [this *Bulletin*, 1953, v. 50, 959], that *Filix* preparations cure 25 to 33% of patients, these preparations work badly in Iran though massive doses are given. Meisel (*Die Medizinische*, 1952, 1199) reported that Vermella capsules or dragees were useful for tapeworm infections and Krueger successfully treated 2 patients with them, finding, as Stein (*ibid.*, 1954, 1457) also did, that proglottids expelled were damaged, apparently by digestion in the host. She refers also, in this connexion, to Oelkers (*Arztl. Forsch.*, 1955, v. 9, 259). Kirchmair [this *Bulletin*, 1955, v. 52, 1212] also found Vermella effective and noted its lack of side-effects.

During two years Krueger has treated men, women and children, all of them ambulant, with Vermella capsules. Adults were given 3 capsules 3 times, cachectic persons and older children (12 to 15 years) 2 capsules 3 times and younger children 1 capsule in the morning, while fasting,

2 to 3 times at intervals of about half an hour. Castor oil or Glauber's salts were also given.

It was concluded that, of the 78 patients treated, 42 were certainly, and 22 probably, cured, 10 being doubtful, while only 4 came back to the doctor because of relapses (or possibly new infections). There were no side-effects, even in a 3-year-old girl in poor condition. The lack of side-effects makes it possible to give this remedy to ambulant patients.

G. Lapage

Harant, H., Castel, P. & Gras, G. Elimination d'*Hymenolepis fraterna* de la souris et du rat par le dilaurate et le dichlorure d'étain di-*n*-octyle. [**Elimination of *H. fraterna* from the Mouse and the Rat by Means of Di-N-octyl Tin Dilaurate and Dichloride**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 427–33. [15 refs.]

Rein, K. Echinokokksykdommen i Nord-Norge. Forekomst og bekjempelse. [**Hydatid Disease in Northern Norway. Occurrence and Means of Control**] *Nordisk Med.* 1957, Nov. 28, v. 58, No. 48, 1853–7, 1 fig. [11 refs.]

The English summary appended to the paper is as follows: —

"Hydatid disease has earlier been considered to be very rare in Norway, but since 1951 thirty-four probable cases have been recorded in the northern part of the country. In the interior of the Finnmark—on the border against Finland—most of the inhabitants are Lapps, and reindeer-breeding is their chief source of livelihood. The disease accompanies the occupation.

"For tending the reindeer the Lapps use a great number of dogs which easily contract the disease by eating infected offals at the local slaughter-houses, especially fresh reindeer lungs. Because of salt hunger the reindeer eat snow contaminated with the egg-laden faeces of the dogs and contract the infection by this route. Thus, the circle is closed.

"The disease can be combatted by disinfecting all the dogs in infected areas, and by preventing them from becoming re-infected by eating waste meat. Inspection at the slaughterhouses would ensure information as to which reindeer herds are infected.

"In man the disease is best demonstrated by compulsory X-ray examination of the chest (screening)."

Rapaport, M., Mieres, A. & Cicolini, J. Hidatidosis endoocular. [**Intraocular Hydatid Cyst**] *Rev. Asoc. Med. Argentina.* 1957, June, v. 71, No. 6, 189–91, 2 figs. [14 refs.]

The English summary appended to the paper is as follows: —

"A case is presented of an endo-ocular hydatidous cyst, located in the

posterior segment of the right eye of an eleven years old boy, that provoked a bleeding and tearing of the retina. Histologically, it was constituted by hyaline membranes of the ectocyst, involutive endocyst and a regular number of scolex. The world bibliography about the matter is reviewed, 11 cases being found, 6 of them doubtful while the remaining have had histological verification. Our own one is the second case described in Argentine literature."

Peraita, P. & Parera, C. Quiste hidatídico epidural medular gigante. [**Massive Epidural Hydatid Cyst of the Spinal Cord**] *Cirugía.* Madrid. 1957, July–Sept., v. 4, No. 13, 85–91, 5 figs.

Savini, R. L'anchilostomiasi tra la popolazione nel corso medio del fiume Topino (Umbria). [**Ankylostomiasis in the Middle Topino Area, Umbria, Italy**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, Sept., v. 38, No. 9, 484–93, 1 fig. [19 refs.] English summary.

de Silva, C. C. **Tropical Ascariasis.** *J. Trop. Pediatrics.* London. 1957, Sept., v. 3, No. 2, 62–73, 6 figs. [15 refs.]

Ascariasis presents a problem in the tropics which is very different, epidemiologically and clinically, from that presented in the West; the cause of the difference in epidemiology is socio-economic rather than climatic, and the differences in the clinical picture are due to the state of nutrition and the weight of infection.

The death rates in Colombo, between 1938 and 1954, from ankylostomiasis have been reduced by five-sixths, whereas those due to ascariasis have not even been halved in the same period.

Out of a total attendance of 280,000 at a Colombo hospital in 1955, 55,000 children were treated for ascariasis. Ascariasis was the commonest cause for admission and, out of 1,967 patients admitted in 1954, 12·8% died.

In 1955 the figures were 1,899 with 6·8% of deaths. The reduction in death rate was attributed to the introduction of piperazine citrate in the treatment.

The age incidence of ascariasis rose sharply from 0·2% in the first and 2·5 in the second 6 months of life to 15·1 in the second year, 19·1 in the third year and 17·7 in the fourth year, to fall more gradually, 12·8, 10·9, 7·4 and 6·2, in the fifth, sixth, seventh and eighth years.

The clinical syndromes encountered can be classified as: (a) gastro-intestinal (i) medical and (ii) surgical; (b) pyrexia and hepatomegaly;

(c) toxaemia with nervous symptoms; (d) pulmonary; (e) atypical, due to migration of larvae to different sites; (f) allergic.

73 patients were admitted to the surgical unit in 1955. Of these, 50 were admitted for partial intestinal obstruction, usually with a palpable lump that might be mistaken for intussusception; an operation was performed on 2, both of whom recovered. Of the rest, 10 had complete intestinal obstruction and 10 acute peritonitis; operation was performed in 9 of the former group with 1 death and on 7 of the latter with 5 deaths. The other 4 patients also died. For intestinal obstruction the best results are obtained by "milking" the worms into the caecum from the ileum where the obstruction always occurred.

Subacute peritonitis also occurs; the appearance in the peritoneal cavity suggests tuberculous peritonitis, with granulomatous tubercles that contain *Ascaris* ova scattered over the surface of the peritoneum.

In the treatment of the condition, after a few years' experience with the carbamyl-piperazine compound (diethylcarbamazine BP), they changed to piperazine adipate or piperazine citrate and have subsequently treated all their patients with these preparations. One-day courses with the adipate produced cures of 62% after one course, 94% after a second course and 100% after the third course.

With the citrate, the figures were 42%, 78% and 90%, respectively, that is, there were 10% of failures; but in another series of 27 patients, in which piperazine citrate was given daily for 3 days in doses of 1 (if under 20 lb.) to 3 gm. (if over 30 lb.), a single course produced a cure rate of 89%. *L. E. Napier*

Roy, S. K., Chatterjee, D. N., Bhattacharjee, S. & Dutt, A. **Treatment of Ascariasis in Children with Piperazine Adipate and Thiocarbanilate.** *J. Indian Med. Ass.* 1957, Oct. 1, v. 29, No. 7, 277–80. [10 refs.]

In the search for the perfect, non-toxic single-dose treatment for ascariasis in children, the authors recall that santonin, oil of chenopodium and tetrachlorethylene are toxic and somewhat unreliable [this *Bulletin*, 1955, v. 52, 63], while hexylresorcinol requires to be administered in capsules since it is liable otherwise to cause stomatitis and may, even then, irritate the intestinal mucous membrane. Piperazine adipate, while tasteless and non-toxic, is not successful in every patient, cure rates of 85·7 to 90·9% having been recorded [*ibid.*, 1955, v. 52, 1110]. A new drug, which is a thiocarbanilate, has recently been introduced, but has not proved very efficient.

The authors report the results of clinical trial of yet another preparation "14914E", which is described as a combination of piperazine adipate and a thiocarbanilate. 32 children in hospital infected with *Ascaris lumbricoides*, between the ages of 16 months and 8 years, constituted

the subjects of the first trial; they received the drug crushed or in tablet form without preliminary preparation, but were given a saline purge at bedtime. Stool examination was repeated at 2, 4, 10 and 21 days after treatment. Each tablet contained 400 mgm. of piperazine adipate and 125 mgm. of thiocarbanilate. Total dosage given was, for those below the age of 2 years, 2 tablets, and for the 2–10 age-group, 4 tablets. Three schedules of administration were followed, *viz.* I. total dose administered as a single dose in the morning; II. total dosage given in 4 divided doses, every 6 hours in one day; III. total dosage given over 3 days in 12 divided doses. The results of schedules I and II were highly satisfactory, complete cure being achieved in 4 out of 4 in the first, and in 19 out of 20 in the second. Schedule III proved less satisfactory, some worms persisting in 3 out of 8 patients. The drug appeared to be free from toxicity and caused no unpleasant side effects.

An out-patient trial was attempted on 78 children between 7 months and 10 years of age, but only 40 attended for stool examination 15 to 20 days later. The same schedules were used, though it was not certain that, in the case of II and III, these were accurately followed by the guardians. Cure rates were lower than in the hospital patients. Schedule I gave 6 out of 8 successes, schedule II 16 out of 20 successes, and schedule III 9 out of 12 successes. In those in whom cure was not complete, second and third courses usually proved successful, though one patient in each of the schedules II and III groups resisted three successive courses.

[The combined drug, manufactured by Ciba Pharma Private Limited, appears worthy of further trial in direct comparison with piperazine adipate alone.] *J. H. Walters*

See also p. 244, Fox, *Anopheles gambiae* **in relation to Malaria and Filariasis in Coastal Liberia.**

Chuang, Cheng-Hua, Hsieh, Hsien-Chen & Wu, Yao-Tsing. **A New Endemic Area of *Wuchereria bancrofti* Infection in Taiwan.** *J. Formosan Med. Ass.* 1957, May, v. 56, No. 5, 171–5.

Hsin-hua town is 8 kilometres east of Tai-nan City and some 3 kilometres from the foothill area of the Central Mountain Range in Taiwan [Formosa]. Most of the 22,756 inhabitants are engaged in agriculture.

Night blood smears of 1,104 inhabitants were examined, of which 53 (4·80%) contained microfilariae of *Wuchereria bancrofti*. There was no significant difference in the rate of infection between male and female. The youngest infected person was 3 years old. The bancroftian microfilariae exhibited a characteristic nocturnal periodicity. The degree of infection was light and the number of carriers with 1–10 microfilariae

per 3 large drops of night blood was 38 (71·70%); the next with 11–50 was 14 cases (26·42%) while only one had over 51 (1·88%). As for the incidence of microfilarial infection by family, there were 38 (86·36%) with one positive, 4 (9·09%) with 2 positives, and one each (2·27%) with 3 and 4 positives, from 44 (24·18%) families among 182 surveyed.

Philip Manson-Bahr

MATTINGLY, P. F. **Notes on the Taxonomy and Bionomics of Certain Filariasis Vectors.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 3, 686–96. [40 refs.]

These are useful notes and comments which will be more fully elaborated in a more extensive report in preparation.

Reproductive isolation is still a criterion for specific status; a subspecies is a wholly, or largely, geographically isolated section of a species population. The species and subspecies categories are much in use in mosquito systematics, though " race ", " variety " and, preferably now, " form " are used for instances where the status of a mosquito population in a species complex is still uncertain. These principles are discussed in terms of current usage in the *Culex pipiens* complex. *C. pipiens* Linnaeus and, in Australia, *C. globocoxitus* Dobrotworsky are reproductively isolated full species. Reproductively compatible with *C. pipiens* but geographically isolated partly or wholly—and thus given subspecific status—are *C. pipiens fatigans* Wiedemann (= *C. quinquefasciatus* Auctt. of American writers) and *C. p. australicus* Dobrotworsky and Drummond. The representatives of the group in China and Japan are best designated *C. pipiens* form *pallens* Coquillett, while *C. p.* form *comitatus* Dyar and Knab is a United States mosquito, and *C. p.* form *molestus*, probably originating in the Mediterranean, is a well-known, widely dispersed variant. For nomenclatorial reasons it is designated a form of *C. pipiens*, although biologically it resembles *C. p. fatigans*.

For the medical entomologist this is an important group presenting practical issues of the first order, *e.g.*, it includes vectors of filariasis and virus encephalitides; hybridization occurs with intergrading of characteristics; they are domestic and liable to introduction to new territories; adaptability to new conditions is potentially good; resistance to insecticides is marked.

The second part of the paper discusses the bionomics of *Taeniorhynchus* (*Mansonioides*) comprising 9 species, all within the Old World limits of West Africa to the Solomon Islands, and mainly tropical. As vectors of *Wuchereria malayi* in the Oriental Region, they are well studied, though in Africa their domestic association and role as vectors of *W. bancrofti* deserve more careful study and investigation. Some account is then given of the biting cycle, swarming habits, and distribution (vertical and seasonal) of *Mansonioides* in Africa as summed from the literature.

D. S. Bertram

Gratama, S. **Acute Necrosis of the Scrotal Skin.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 280.

In 2 years the authors have observed 4 cases of a peculiar scrotal disease in Liberia. A typical case in an employee of a plantation is described. He had acute pain in a gradually swelling scrotum which began 4 days before admission. Examination showed that two-thirds of the skin was necrotic, leaving a skin flap of only about 4 cm. around the base. Treatment with penicillin and a furacin dressing for 4 days resulted in detachment of the skin and subcutaneous tissue. On removal of these with forceps and scissors, the two testes in their tunicae were left hanging outside. Further dressing with furacin gauze resulted in the development of clean granulation tissue and in the third week a split thickness graft was applied with success. The patient was discharged, fully recovered, 12 days later. The jelly-like oedematous subcutaneous tissue as seen in elephantiasis of the scrotum suggested filariasis and the blood smear was positive for " filaria ". Filariasis is widespread in the coastal area of Liberia and the whole range of filarial disease occurs clinically, except for eye lésions. *H. J. O'D. Burke-Gaffney*

Turner, L. H. & Edeson, J. F. B. **Studies on Filariasis in Malaya: the Periodicity of the Microfilariae of** *Wuchereria malayi*. *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 271–7, 2 figs. [13 refs.]

That the microfilariae of *Wuchereria malayi* tend to show a nocturnal periodicity is indisputable, but the completeness or otherwise of their periodicity, as seen in night blood, varies, not only in different countries, but also in areas within a few miles' radius of each other. " Until recently these divergent findings seemed relatively unimportant and probably explicable by random variation among the individual microfilaria-carriers observed. The studies reported in the present paper, however, suggest that there are definite differences in the periodicity observed in various localities, even within the boundaries of one small country, and that these differences may be of considerable importance in the epidemiology of filariasis due to *W. malayi*."

The authors of the present paper made studies in 26 of the human carriers of the microfilariae of *W. malayi* in Penang and in 20 carriers from East Pahang. The microfilariae in the carriers from Penang showed a marked nocturnal periodicity, whereas the nocturnal rise in microfilariae in carriers from East Pahang was much less marked and microfilariae could always be found in the peripheral blood during the day. The authors discuss the various factors that might account for these differences. (1) Differences in the techniques as practised in the two areas were found to be trivial and could not be held accountable. (2) That the differences might be due to preponderance of persons of one sex or

one age-group was very carefully considered, and dismissed as unlikely. (3) The patients examined in both areas were healthy and there was no suggestion that an excess of debility in one area as compared with the other, could account for the differences. (4) It has been suggested that the different periodicity patterns may be linked with the biting habits of the vector. "The main vector of *W. malayi* in East Pahang and Lower Perak is *Mansonia longipalpis*, a mosquito noted for its ability and willingness to bite in shade at any time of the day or night. In Penang, it is probable that night-biting anophelines are the main vectors, while in Kedah it is likely that the vectors are species of *Mansonia* other than *M. longipalpis* and that daytime bites are few. It thus seems that, if there is a correlation between periodicity and vector, it is not absolute." (5) Finally, it is possible that "the presence of two separate forms of the worm, with microfilariae morphologically similar but differing in periodicity, is a possible explanation of the findings here reported".

The authors conclude by pointing out that the differences in periodicity which they have shown to exist in Malaya may prove of considerable practical importance: "In the Penang-Kedah area the later the blood is collected after nightfall, the more accurate will be the results up to about 1 a.m.; whereas in East Pahang even a daytime survey will reveal almost all the carriers of *W. malayi*-type microfilariae. But, wherever infections of *W. malayi* and periodic *W. bancrofti* are likely to occur together, then surveys must be made at night, otherwise the *W. bancrofti* infections will be missed." *R. M. Gordon*

WHARTON, R. H. **Studies on Filariasis in Malaya: Observations on the Development of *Wuchereria malayi* in *Mansonia* (*Mansonioides*) *longipalpis*.** *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 278–96. [30 refs.]

The experiments, the results of which are summarized below, were carried out with adequate numbers of wild-caught *Mansonia* (*Mansonioides*) *longipalpis*. The use of wild-caught mosquitoes was necessitated by the great difficulty experienced in establishing a laboratory colony and by the fact that, up to the present, only very few larvae of this species have been recovered from natural breeding sites. The author describes the precautions he took to prevent any misinterpretation of the results which might be caused by the inclusion of filarial infections acquired before the adult mosquitoes were brought to the laboratory and he makes it clear that these were sufficient to prevent any statistically significant error.

The author's summary is as follows:—

"1. As an introduction to a study of filariasis in East Pahang, Malaya, observations were made on the developmental pattern of *Wuchereria*

malayi in *Mansonia* (*Mansonioides*) *longipalpis*. They provide the background and standards for later experiments to determine the efficiency of *Mansonia* mosquitoes as laboratory vectors of filarial infections.

"2. *M. longipalpis* was found to be very receptive to the microfilariae of *W. malayi*. Microfilariae ingested with the blood-meal pass directly to the stomach, from which they migrate through the stomach wall to the abdominal haemocoele and thence to the thorax. Migration is rapid, the microfilariae being free in the abdomen 10 minutes after the blood-meal and already beginning to reach the thorax." [Elsewhere the author writes: "An appreciation of this rapid migration is of some importance, since it means that mosquitoes must be dissected immediately after feeding if an estimate of the intake of microfilariae is to be based on a smear of the stomach contents, as was done by Kershaw *et al.* (1953)" (this *Bulletin*, 1954, v. 51, 83).] "Migration is almost complete after 12 hours. There is no apparent loss of microfilariae during migration or of larvae during development. Mature larvae appear on the 10th day after the blood-meal, and about half the larvae are mature on the 11th day.

"3. From estimates of the size of the blood-meal (2–5 c.mm., mean 3·0 c.mm.) and of the numbers of microfilariae found in the stomach blood immediately after feeding, compared with the numbers of microfilariae in the peripheral blood of the donor at the time of feeding, *M. longipalpis* apparently ingests more microfilariae than would be expected. Similar observations on *Aëdes aegypti* and *Ae. albopictus* showed that both species usually ingest about the same number of microfilariae as would be expected, though a few *Ae. aegypti* take in much larger numbers. All species were observed to discharge droplets of clear fluid while feeding; the magnitude of the error thus produced in weight estimations of the size of the blood-meal is unknown. The number of microfilariae found in the stomach immediately after feeding shows that for the present it may be assumed that *M. longipalpis* ingests the equivalent of 5 c.mm. of blood.

"4. Infective (mature) larvae which were transferred to the abdomen of uninfected *M. longipalpis* moved actively through the mosquito and reached the head within 15 minutes. It is therefore assumed that any mosquito found in nature with infective larvae in any part of the body should be regarded as infective to man.

"5. A comparison between two very similar forms, *M. longipalpis* and *M. bonneae*, both usually included under the name *M. longipalpis*, showed that there is no difference in their susceptibility to infection with *W. malayi*.

"6. In a discussion of the efficiency of mosquitoes as vectors of filarial infections, it is suggested that the most important point about any group of mosquitoes fed on a microfilaria-carrier is the number of mature larvae produced. An index of experimental infection, modified from Kartman [*ibid.*, 1954, v. 51, 959], is suggested.

"7. A field-survey technique is described for a rapid estimation of the proportion of mosquitoes which pick up an infection when feeding on an infected population; it may be of value in areas where mass drug treatment is in use." *R. M. Gordon*

WHARTON, R. H. **Studies on Filariasis in Malaya: Notes on the Breeding of *Mansonia* (*Mansonioides*) Mosquitoes in the Laboratory.** *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 297–300, 2 figs. on pl.

By slightly modifying the technique described by JAYEWICKREME and NILES [this *Bulletin*, 1953, v. 50, 52], *Mansonia* (*Taeniorhynchus*) *uniformis* has been reared in Malaya to the third generation. Females are fed and kept in glass lamp chimneys. To obtain eggs the chimneys containing females fed on blood are placed with one end in water, and water lettuce plants (*Pistia*) are introduced from underneath. The females lay egg masses on the plants, and more eggs are obtained in this way than are obtained by keeping females in 1-foot-cube cages containing bowls of floating *Pistia* plants. The water hyacinth (*Eichornia*) has been found to survive better than *Pistia* in the guineapig-dung infusion (2–3 gm. of dried ground dung per 400 cc. of water) used as a larval breeding medium. It was not found necessary to add anything to the breeding medium other than fresh plants, although the age of the infusion recommended is from 6 to 8 days. Under these conditions the period from egg laying to emergence of the adults is about 25 days at 22°–33°C.

With the same method *M. longipalpis* has been reared from egg to adult, but attempts to rear adults of *M. annulatus* from eggs have failed. *B. R. Laurence*

GERBAUX, A., GARIN, J. P. & LENÈGRE, J. Cardiopathie et filariose. [**Cardiopathy and Filariasis**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1957, Nos. 25/26, 873–87, 3 figs. [13 refs.]

This paper is based upon observation of 5 cases of filariasis (*L. loa* in 4, species indeterminate in one) with cardiac insufficiency. It was only after the elimination of all possible causes of this cardiopathy and of the hypereosinophilia associated with it that the possibility of filariasis as the overlying cause was envisaged, and it is claimed that this view was finally confirmed from the evidence of other cases which have already been reported in the literature (5 of right-sided heart failure and one of pericarditis). The cardiac picture is that of general failure with preponderance on the right side, with increase of cardiac volume and the presence of a systolic murmur concentrated at one particular point. The evolution of the cardiopathy is not influenced by symptomatic treatment.

From a study of the reported cases it is claimed that cardiac lesions of filarial origin consist of pericardial exudates, sclerous myocarditis,

intracardiac thrombosis and possibly also parietal endocardial fibrosis resembling that described by Löffler. The frequency of this "filarial heart" still remains uncertain.

[On the evidence presented in this paper, much of it uncritical, it is difficult to believe that filariasis can in any way be connected with cardiac disease.] *Philip Manson-Bahr*

Le Corroler, Y., with the technical collaboration of L. Malmanche. Évolution de *Dirofilaria immitis* Leidy 1856 chez *Aedes* (*Stegomyia*) *aegypti* Lin. souche "Orlando" (Floride). [**Development of** *Dirofilaria immitis* **in** *Aëdes aegypti*. **Strain Orlando**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 542–55, 3 charts, 1 text fig. & 7 figs. on pl. [18 refs.]

Ovazza, M. Présence de simulies du "groupe *neavei*" au Moyen-Congo, Afrique Équatoriale Française. [**Presence of** *Simulium* **of the** *neavei* **Group in the Middle Congo, French Equatorial Africa**] *Bull. Soc. Path. Exot.* 1957, July–Aug., v. 50, No. 4, 537–9, 3 figs.

Lewis, D. J. **Aspects of the Structure, Biology and Study of** *Simulium damnosum*. *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 340–58, 4 figs. [Numerous refs.]

The greater part of this paper is devoted to short summaries of observations on various structural features of the adult fly, some of which will prove useful in the estimation of age and state of development of wild-caught specimens. The author gives a record sheet useful for recording these observations, and a table for possible combinations of the observations by which the age of captured females can be estimated. During blood feeding the abdomen swells between the thorax and the fifth abdominal segment. One of the functions of the scale, which is here treated as an accessory sclerite in the posterior part of the first abdominal segment, is to help strengthen the abdomen of a replete fly. Brown granules in the fat body, and brown tissue around the spermathecae, are present in newly hatched flies, 3 to 6 hours after emergence. Most flies biting for the first time have abundant fat body, although some may have none. Yellow fluid (meconium) in the gut, left over from pupal reorganization, may be present in captive bred flies for 3 hours or more, and it has persisted for up to 4 days. Many wild-caught specimens show the presence of the meconium. Newly emerged *Simulium* are found with the Malpighian tubules containing droplets in the cells, making the tubules appear opaque. In most parous flies each tubule has alternating opaque and clear areas, and the tubules are clear in a few old flies which tend to have a high *Onchocerca* rate. Most flies bite before a gonotrophic cycle begins, although most parous flies can be recognized by the distension and wrinkling of the oviducts. The fat body is not built up after

the blood meal, and the wings of old flies do not fray in the same way as the wings of tsetse flies.

One-hour standing catches are recommended in preference to shorter catches. A method is given for the dissection of adult flies, involving the cutting away dorsally of a longitudinal strip of body wall, and subsequent dissection away of the ventral part of the abdominal body wall from the viscera. A method is also given for keeping flies individually in glass tubes with muslin caps, containing small wax cups of filter paper soaked in sugar. The tubes were kept in a dish, floating on water in an almost sealed tin. *B. R. Laurence*

WRIGHT, F. N. **Rearing of *Simulium damnosum* Theobald (Diptera, Simuliidae) in the Laboratory.** [Correspondence.] *Nature*. 1957, Nov. 16, v. 180, 1059.

Simulium damnosum has been reared in Ghana from eggs in an aquarium containing 3 gallons of river water, which was circulated by a pump delivering approximately 60 gallons per hour. Apparently the water was circulated over an inclined trough of corrugated asbestos roofing material, arranged so that a small 2-inch waterfall fell from the lower end of the trough into the water. [There is no figure of the apparatus and the description is not clear to the abstracter.]

A mass of approximately 10,000 eggs introduced into the trough hatched 3 hours after collection and "continued to hatch during the following day". The water became clearer during the growth of the larvae, and it was replaced by river water concentrated 500 times through a fine plankton net, at increasingly frequent intervals; half a gallon of water was removed and replaced by an equal volume of concentrate. 14 to 17 days after hatching pupae were found, but only 7 adults emerged 2 to 3 days later, from 8 pupae obtained from the 10,000 eggs.

A note added to the proof records a perhaps more successful rearing, when the river water was changed completely every 2 days. The length of larval life is given in this additional note as from 14 to 40 days. Males emerged 16 days, and females 20 days, after hatching. *B. R. Laurence*

MUIRHEAD-THOMSON, R. C. **The Development of *Onchocerca volvulus* in Laboratory-Reared *Simulium damnosum* Theobald.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 912–13.

This brief note records the development of infective larvae of *Onchocerca volvulus* in *Simulium damnosum* within 7 days of the ingestion of microfilariae. This result was obtained with laboratory-reared flies in Liberia. It is of interest in that it has previously proved very difficult to study the course of the worm's development in other than wild-caught flies. *D. S. Bertram*

i. Muirhead-Thomson, R. C. **Laboratory Studies on the Reactions of *Simulium* Larvae to Insecticides. I. A Laboratory Method for studying the Effects of Insecticide on *Simulium* Larvae.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 920–25, 4 figs.

ii. ———————. **II. The Reactions of *Simulium damnosum* Larvae to DDT.** *Ibid.*, 926–32, 2 charts.

iii. ———————. **III. The Reactions of *Simulium damnosum* Larvae to Dieldrin.** *Ibid.*, 933–4.

i. The first paper describes the essential features of a method of maintaining *Simulium* larvae (*Simulium damnosum*) for exposure in the laboratory to known doses of insecticide for about one hour, and a follow-up period of up to 48 hours. The work was done in Liberia, where for much of the year field samples of grasses from natural breeding places of *S. damnosum* supported this species almost exclusively. In the laboratory, the vegetation was transferred from the enamel collecting dishes to tall glass jars (15 litre capacity) and stream water added to make up 5000 ml. Compressed air introduced near the bottom of the jars by a glass tube provided a vigorous turbulence. The larvae—young and old—moved to the glass side of the jars along the course of the turbulence. The weed was then taken out and the water level brought up to 5000 ml. About 50–100 fully-grown larvae, and others younger, was the usual size of sample thus obtained. Estimates were made of very young, intermediate and full-grown larvae present.

For insecticide tests with DDT, 0·1 ml. of a DDT-acetone solution was added slowly to the turbulent path in the 5000 ml. of water in the jar. At the end of an hour all the water was decanted (few larvae were detached during this procedure) and the jar of larvae was rinsed with clean water. It was then filled up again to 5000 ml. with stream water. At 24 and 48 hours, counts were made of live larvae still in the turbulent path. The 5,000 ml. of water was also decanted and made up afresh; dead larvae in the discarded water were also counted. In 48 hours, mortality in untreated controls was seldom greater than 10%. At 24 hours acetone alone was harmless, but mortality rose as high as 23% at 48 hours. For insecticide tests the mortality was adjusted by Abbott's formula:

$$\text{Adjusted mortality \%} = \frac{\text{Actual mortality \%} - \text{Control mortality \%}}{100 - \text{Control mortality \%}} \times 100$$

ii. The second paper reports results with DDT-acetone solutions. Since 1-hour treatment with 0·1 p.p.m. or stronger gave 100% mortality in 24 hours, tests were made of several lower concentrations—from 0·01 p.p.m. to 0·0005 p.p.m. At 0·001 p.p.m. no effect was noted in full-grown larvae at 24 hours, but a kill was apparent by 48 hours. By interpolation on log concentration-probit graphs, the LD50 for a 24-hour observation

was about 0·005 p.p.m., and 0·002 p.p.m. on a basis of a 48-hour follow-up. Effects of varying the period of exposure are considered. An exposure for 5 minutes to 0·01 p.p.m. was about equivalent in effect to 1 hour at 0·001 p.p.m. Increasing the time to 15 minutes gave a mortality between that for 0·002 p.p.m. and 0·005 p.p.m. over 1 hour. Young larvae were notably more susceptible than older ones, particularly when exposed for short periods to the stronger concentrations of DDT. Tests with a DDT emulsifiable concentrate at 0·01 p.p.m. and 0·005 p.p.m. for 1 hour revealed this formulation to be less effective than the DDT-acetone solutions.

The second paper indicates the usefulness of the method for testing different formulations, levels of susceptibility of different stages of larvae and different species of *Simulium*, and changes in larval tolerance to an insecticide.

iii. This paper reports on tests of dieldrin, either as a 20% emulsifiable concentrate or, latterly for a few tests, as pure re-crystallized HEOD [the active substance in dieldrin] in acetone. With dieldrin the concentrate was more effective than the acetone preparations. Dieldrin gave 100% larval mortality at 24 hours at concentrations as low as 0·001 p.p.m. The effectiveness then fell off sharply with mortality only 24% at 0·0005 p.p.m. and nil at 0·0002 p.p.m. This contrasts with DDT, in which mortality decreases fairly steadily and proportionately to decreasing concentration of insecticide in the range of 0·01 to 0·001 p.p.m. In general, dieldrin appears to be effective at concentrations at least 10 times lower than for DDT. *D. S. Bertram*

Lagraulet, J., Le Breton, G. & Rit. Lésions histologiques du segment postérieur dans un cas d'onchocercose oculaire. [**Histological Lesions of the Posterior Segment in Ocular Onchocerciasis**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 364, 369–72.

The authors describe the clinical and pathological findings in 3 patients with onchocerciasis with typical anterior and posterior segment lesions. Although the choroido-retinal changes were very pronounced, in none of the cases did they find microfilariae. They compare this finding with the findings in an eye enucleated by Professor Giaquinto in Guatemala in 1933, histological examination of which disclosed healthy microfilariae in the ocular muscles, the cornea, the iris, the choroid, the retina, and in the optic nerve itself.

They emphasize that these microfilariae were healthy and were not exciting any inflammatory reaction. The authors are reluctant to say that these posterior segment lesions are therefore not due to onchocerciasis, and they postulate that the lesions are excited by the presence of dead worms or dead microfilariae at a distance.

They mention some experiments they have conducted on rabbits, in which the intra-orbital implantation of human onchocercal cysts, presumably containing dead worms and dead microfilariae, produced vascular pigmentary choroidal lesions in the eye of the rabbit. These experiments are not given in any detail. They suggest that the toxin acts primarily upon the vessels of the retina, producing a sheath, which is so marked a feature of these lesions in the African eye. *D. P. Choyce*

Bumbalo, T. S., Plummer, Lois J. & Warner, J. R. **Treatment of Enterobiasis with One Oral Dose of Promethazine Hydrochloride.** *J. Amer. Med. Ass.* 1957, Aug. 10, v. 164, No. 15, 1651–3. [13 refs.]

Phenothiazine has been used for some years in the treatment of enterobiasis, but it is very toxic. Promethazine, an antihistaminic, is a derivative of the former drug and has been recommended for the same purpose [this *Bulletin*, 1956, v. 53, 1471].

In a resident paediatric institution, 184 children were examined by the "cellophane"-tape method for *Enterobius* infection. Of these 107 were found infected, on one or both of two examinations and in 77 no infection was demonstrated. Each of these children, aged 2 to 16 years, was given a single dose of 125 mgm. of promethazine at bedtime.

Daily smears were taken each morning before a bath from 94 of the 107 treated children for 7 consecutive days, from the tenth day after the treatment. Of these 94 children, all but 5 were still infected, a cure rate of 5·3%.

Of the children who had negative smears before treatment and were also treated, 21 had 7 negative smears; the remaining 56 had positive smears.

In addition 24 infected children were given pyrathiazine, 10-[2-1(pyrrolidyl)-ethyl] phenothiazine hydrochloride, in a single dose of 125 mgm.; these were similarly examined and a cure rate of 12·5% recorded. No ill-effects from either drug were noted, but the author does not consider that the results he obtained justify the classifying of either of these drugs as efficient oxyuricides. *L. E. Napier*

Chase, G. O. **Death due to Eosinophilic Myocarditis related to Trichinosis. Report of a Case.** *J. Amer. Med. Ass.* 1957, Dec. 7, v. 165, No. 14, 1826–9, 3 figs. [13 refs.]

Report of a case diagnosed at autopsy.

DEFICIENCY DISEASES

Food and Agriculture Organization of the United Nations. **FAO Nutrition Meetings Report Series No. 14. Report of the Nutrition Committee for South and East Asia. Fourth Session. Tokyo, Japan, 25 September–2 October, 1956.** Sponsored jointly by FAO and WHO. pp. v + 49. Rome: 1957. [Sales Agent for U.K., H.M. Stationery Office.] [$0.50; 2s. 6d.]

The reports of the FAO regional nutritional committees are now an established part of nutritional literature. The general conclusions of this Committee can be summarized thus: Throughout much of the region there is now no acute shortage of food. In most countries food supply has increased more rapidly than population, yet the foods which are at present produced or imported do not provide a satisfactory diet for the population; diets are, in general, defective in quality. This general picture permits a sober optimism for the future, though it is quite clear that the food production programmes have still a long way to go. [Unfortunately the committee makes no reference to the population control programmes in Japan and India, which have been so much discussed lately. Surely this is the most important aspect of the nutrition problem in the region. United Nations organizations, if they are to provide world leadership, cannot turn the blind eye.]

The most interesting chapter of the report is on beriberi. In Japan the incidence has been greatly reduced and it is no longer a major problem. This is in part due to replacement of rice by wheat and other cereals and in part to the production of synthetic thiamine. Over 45,000 kgm. were manufactured in Japan in 1955, of which about one-third was used at home and the rest exported. On the other hand there is evidence that in rural areas, especially in Burma, Thailand and Viet-Nam beriberi is increasing, particularly in the infantile form. This may be due to an increase in the use of small village mills and a decline in the use of home-pounded rice. This is a subject on which the committee recommends further research.

Blindness of nutritional origin due to keratomalacia remains an important problem. Over 9,000 cases were seen by ophthalmologists in Indonesia. While vitamin A deficiency is probably the principal cause, an all-round deficiency in the diet, and especially of protein, may contribute.

Other important diseases discussed are protein malnutrition and microcyte iron deficiency anaemias. There are also chapters devoted to problems of food technology and education in nutrition.

[There can be no question that this conference served a useful function "in bringing together nutrition workers from different countries . . . for the exchange of information, the study of problems of importance, and the formulation of extended programs for practical action". This excellent report extends this field of utility. The most serious defect in the

Committee was the absence of any delegates from India, the country in the region with the best contemporary record for nutritional research. It may well be that the Indian Government considers a 3-year interval between conferences too short; probably a 5-year interval would be more satisfactory. A final suggestion is that the list of delegates contains very few names of clinicians of experience. Food administrators and technologists, social scientists and home economists, information officers and press attachés all have an important part to play in nutrition programmes. But the whole programme must rest on a sound assessment based on clinical judgment. It is to be hoped that the national governments, FAO and WHO will be able to recruit sufficient capable young physicians for their future programmes.] *R. Passmore*

Steenmeijer, F. **Food and Nutrition of Arubans.** [Thesis.] pp. 139 + 8 loose, 7 graphs, 1 map, 1 text fig. & 4 figs. on 4 pls. 1957. Utrecht: Fa. Schotanus & Jens.

A full study made in Aruba, the smallest of the 3 Dutch Leeward Islands.

Bibile, S. W., Lionel, N. D. W., Dunuwille, Rohini & Perera, Gnana. **Pantothenol and the Burning Feet Syndrome.** *Brit. J. Nutrition.* 1957, v. 11, No. 4, 434–9.

"1. A controlled clinical trial to test the efficacy of pantothenol in the burning feet syndrome was carried out in a rural area in Ceylon.

"2. Sixty patients, selected for trial on the basis of predetermined clinical criteria, were allocated at random into three treatment groups. One group received 500 mg pantothenol twice a week by injection, another received it orally and the third served as control and received propylene glycol by mouth or injection instead of pantothenol. Neither the patients nor the doctors conducting the trial knew the nature of the treatment given to any particular patient.

"3. The results did not show any significant difference in the cures obtained between the control and treated groups of patients."

Misra, S. M. **Pellagra—its Nature, Diagnosis and Treatment (with a Review of Twelve Cases).** *Pakistan Med. J.* 1957, Nov., v. 8, No. 11, 27–38. [17 refs.]

"Twelve interesting cases of pellagra have been reported. Actiology, clinical features, diagnosis and treatment have been discussed. Pellagra is caused by a deficiency of nicotinic acid. Riboflavin deficiency may play an important role. A combined nicotinamide, riboflavin, and liver therapy offers the best results."

Rhodes, Katerina. **Two Types of Liver Disease in Jamaican Children. Parts I, II & III.** *West Indian Med. J.* 1957, Mar., June & September, v. 6, Nos. 1, 2 & 3, 1–29; 73–93; 145–78, 14 figs. (9 on 4 pls.) [Numerous refs.]

This paper formed the author's MD thesis at the University of St. Andrews. It gives an account of veno-occlusive disease of the liver and kwashiorkor as seen in Jamaica and is based on published work by the author and her colleagues, nearly all of which has been previously abstracted in this *Bulletin* [see this *Bulletin*, 1952, v. 49, 437, 892; 1953, v. 50, 329; 1955, v. 52, 394, 1219; 1957, v. 54, 77, for other references].

R. Passmore

SPRUE

Douglas, R. A. **Sprue.** *Med. J. Australia.* 1957, Oct. 12, v. 2, No. 15, 525–6.

The chief interest in this paper lies in a description of sprue as it presents itself at the present time in North Queensland. This disease has been apparent there since the early days of European settlement, and at one time it was quite common, as related by Breinl and Priestley in 1917. Cilento in 1942, however, stated that at that period sprue was very rare. At present it is rare in Europeans and the author has seen 3 cases in the last 3 years. Although there is no previous record in Australian aborigines there is no doubt that it occurs among them and the author has seen 10 cases during the last 2½ years. In addition to these there are 4 which were incompletely investigated. 6 hailed from Palm Island Settlement, one from Yarrabah Mission near Cairns, 2 from Hopevale Mission at Cooktown and one from Mona Mona Mission near Kuranda.

The sexes were equally divided and the average age was 28. All had lost weight and most gave a history of diarrhoea. Aphthous stomatitis was noticed in 8. The faecal fat value was increased in 6 out of 9 thus investigated. The peak of the oral glucose tolerance curve was diagnostically low—less than 45 mgm. per 100 ml. in 6 out of 8. X-ray examination of the small intestine by barium meal was carried out in 9 patients and a deficiency pattern was present in 8. A gross degree of anaemia was present in all and 7 had a haemoglobin value of less than 4·0 gm.%, with a megaloblastic marrow. A histamine test meal showed the presence of free hydrochloric acid in the stomach in 5 out of the 9 patients. The serum calcium content was slightly low in 4 patients. It was noted that all patients were febrile and that the fever gradually subsided with treatment. In 2 the spleen was initially palpable. Another feature, hitherto undescribed, was the presence in 4 patients of stippled, bluish-black pigmented patches on the tongue. While similar pigmentation is frequently seen in healthy aborigines, in the author's patients it was less

pronounced after treatment. 4 patients responded to treatment with vitamin B12. In the remaining 5 there was no response, but they immediately improved with folic acid.

Thus it is concluded that sprue must be common and widespread among aborigines in N. Queensland. While it is probably true that most of the patients were eating a deficient diet, it is also true that the sanitation is extremely poor. It is suggested that improved sanitation has led to virtual disappearance of the disease in the European population.

Philip Manson-Bahr

Baker, S. J. **Idiopathic Tropical Steatorrhea. A Report of Sixty Cases.** *Indian J. Med. Sci.* 1957, Sept., v. 11, No. 9, 687–703, 5 figs. [23 refs.]

The author summarizes the findings in 60 unskilled villagers attending Vellore hospital complaining of chronic diarrhoea, vague abdominal pains or discomfort, or complications (see below). Patients were aged more than 12 years. The condition affected males rather than females. Except for 15 patients, the diet before entry into hospital was adequate to good. The clinical history extended usually to 12 months or less, occasionally years; one patient had had coeliac disease, 5 had had previous similar attacks.

Some patients presented the picture of classical tropical sprue. Others were almost symptomless. The remainder were suffering from syndromes of intermediate severity. All had loose stools with or without colicky pain and borborygmi or altered bowel habits. Many complained of abdominal fullness or distension; some had retrosternal and abdominal burning pains or rectal and perianal discomfort after defaecation. Nausea and vomiting were common, in 4 patients so severe as to suggest pyloric obstruction. Most had anorexia. Some loss of weight had occurred in 36. Other symptoms included asthenia, breathlessness, leg oedema, various vitamin deficiencies and skin pigmentation.

Some patients were wasted and had distended doughy abdomens. Pallor of the mucous membranes was common. Half showed signs of vitamin A deficiency; 19 had glossitis; 10 had angular stomatitis. 3 had liver cirrhosis with portal hypertension, 3 had pulmonary tuberculosis, 2 had duodenal ulcer and 8 cardiac failure. The fluid/electrolyte balance was grossly disturbed in some of the more seriously ill patients.

Examination of the stool showed bulky faeces in 56 cases. The stool was watery or mushy in all and mucus was present at some time in about 60%. *E. histolytica* cysts or vegetative forms were present in 5 patients, hookworm in 20, *Giardia* in 2. Fat globules were common and usually (but not always) indicated severe steatorrhoea.

Fat absorption was studied in all 60 patients and in 15 controls. Normal excretion was 1 to 4·5 gm. per day (91 to 98% absorption); excretion in patients varied from 6 to 23 gm. per day (54 to 58%

absorption). There was little correlation between the degree of steatorrhoea and the clinical state. Histamine-fast hypochlorhydria was present in 5 of 30 patients examined. Oral glucose absorption curves were flat in most. Some flocculation of barium suspensions (even the "non-flocculating") was seen in those patients examined, but in 6 there were no radiological changes. Serum protein was low in 12 patients (lowest 2·9 gm.%); in 8 the albumin/globulin ratio was reversed. There was some correlation between the degree of wasting and oedema and the presence of low protein concentration. In 35 patients the haemoglobin concentration was below 10 gm.% (a proportion of anaemia greater than in the general population). 16 patients had megaloblastic anaemia, others had iron-deficiency anaemia. Of the former, 15 responded to B12 administration and one to folic acid. Of the latter, all except 4 responded to oral iron; the 4 responded to intravenous administration.

Rest in bed (diet not stated) was followed in many cases by great improvement. The standard routine was to control the diarrhoea and pain with bismuth or *tinct. opii* and belladonna. Vitamins were given as required, parenterally if possible. Where there was gross loss of weight or obvious reduction in serum protein the patients received a high protein diet. Fats were given according to the patient's desire. One patient showed temporary improvement on a gluten-free diet. Patients with megaloblastic anaemia responded to B12 or folic acid so far as haemopoiesis was concerned, but without improvement in fat tolerance. Oral chemotherapy with antibiotics helped in some cases (judged by improvement in fat absorption), but not in others. Prednisolone brought about some subjective improvement but had no effect on fat absorption.

In a very interesting discussion the author considers the aetiology of the group of conditions examined. Some were classical sprue; others were not, but might belong to a wide but still connected group of steatorrhoea with small intestinal dysfunction. "It is suggested that this may not be a well defined disease entity but rather a symptom complex, or syndrome, characterised by steatorrhea and other evidence of intestinal dysfunction. For this reason the designation 'tropical idiopathic steatorrhea' has been suggested for use until such time as the etiology is determined." The author refers at length to differential diagnosis from other causes of acute diarrhoea and steatorrhoea. So far as prognosis is concerned he regards the condition as probably self-limiting. He emphasizes the frequency of steatorrhoea syndromes in Indians.

B. G. Maegraith

Mollin, D. L., Booth, C. C. & Baker, S. J. **The Absorption of Vitamin B_{12} in Control Subjects, in Addisonian Pernicious Anaemia and in the Malabsorption Syndrome.** *Brit. J. Haematol.* Oxford. 1957, Oct., v. 3, No. 4, 412–28, 6 figs. [Numerous refs.]

Vitamin B12 labelled with radio-active cobalt was administered to controls and patients with pernicious anaemia or malabsorption syndromes,

including 17 patients with idiopathic steatorrhoea and 6 with "chronic tropical sprue".

Two-thirds of the patients with idiopathic steatorrhoea absorbed as little B12 as did patients with pernicious anaemia; the others absorbed the vitamin normally. In 3 who failed to absorb B12 the serum concentrations were normal, indicating an anaemia "apparently entirely due to deficiency of folic acid".

5 of the patients with sprue absorbed B12 badly. In one case absorption was improved by long treatment with folic acid. The authors conclude that the megaloblastic anaemia of sprue is due to deficiency of B12, folic acid or both. There was a greater incidence of B12 deficiency in sprue than in idiopathic steatorrhoea.

Antibiotics sometimes but not always improved the absorption of B12, probably as a result of changes in the intestinal flora.

[Details of cases and criteria of diagnosis are not given in this interesting paper.] *B. G. Maegraith*

HAEMATOLOGY

Bronte-Stewart, B., Hickley, J. M. & Ethelston, J. D. **Haematological Standards for Adult South African Males. An Inter-Racial Study.** *South African J. Lab. & Clin. Med.* 1957, June, v. 3, No. 2, 131–41, 4 figs. [28 refs.]

In Cape Town it is possible to compare haematological values for whites, "Cape Coloureds," and Bantu, free from occult tropical disease or intestinal parasitism. In 1952 the authors found the mean corpuscular haemoglobin concentration (MCHC) to be less in a sample of 150 Bantu subjects than in 25 European; but the former, though apparently healthy, were hospital out-patients. In 1955 larger and more comparable groups of adult males, 223 Bantu, 171 Cape Coloured, and 174 Europeans, were sampled, mainly from industries employing all racial groups simultaneously. The values recorded were:—

Erythrocyte sedimentation rate (ESR). The proportion of subjects with an ESR exceeding 8 mm./hour (Wintrobe's method) was 31% for the Bantu, 12% for Cape Coloureds, and 3% for Europeans. Within two separate age-groups (the 3rd and 4th decades) differences of the same nature appeared, while in all races the ESR rose with age. High values for the ESR were commoner in low-income categories in Bantu and Cape Coloureds, and were accompanied by significantly lowered serum albumin, and raised gamma and alpha 2 globulin levels.

Haemoglobin, packed cell volume, and MCHC. Comparisons were made after excluding subjects with an ESR of over 8 mm./hour, and showed no significant differences in these values between the three races,

though the European averages slightly exceeded the Cape Coloured, and the latter the Bantu.

Mean corpuscular diameter (*MCD*). By the halometer, the Bantu MCD was 7·84 ± 0·39μ, the Cape Coloured 7·81 ± 0·32μ, and the European 7·64 ± 0·40μ, the last differing significantly ($P<·001$) from the non-European figures. This difference could not be correlated with the serum protein pattern, or the presence of animal protein in the diet, and the authors could not ascribe it to liver disease. It is mentioned that the MCD was not related to the sedimentation rate. With this one exception, the authors stress the lack of significant differences in haematological standards in the three racial groups. *A. B. Raper*

McAlpine, S. G., Douglas, A. S. & Robb, R. A. **Clinical Assessment of Haemoglobin Concentration.** *Brit. Med. J.* 1957, Oct. 26, 983–4.

The purpose of this investigation was to assess (i) with what accuracy haemoglobin percentage could be predicted by clinical examination only, (ii) whether inspection of the conjunctivae was more or less accurate than inspection of the palm creases, and (iii) whether an overall assessment based on the appearance of the patient and colour of the conjunctivae and palms was more or less accurate than any single form of assessment.

200 patients were seen individually by two of the authors and an initial assessment of facial colour was recorded as normal or pale. Palm creases were inspected with the skin of the palm stretched and held at heart level and an estimate of the haemoglobin level in multiples of 5% was recorded. The results of assessment were compared with those obtained by measurement of haemoglobin with an EEL photo-electric colorimeter.

Close agreement was obtained between the estimates of the two observers. It was found that there was only a small liability to error with estimates of haemoglobin of 50% or less, but that at 60% the error was appreciable and above this level often completely unreliable. The fallibility of observation of the skin as a means of estimating haemoglobin level was emphasized; 28% of patients with normal skin colour had haemoglobin values less than 80% and 34% of those with pale faces had 80% or more haemoglobin.

The most accurate assessment of haemoglobin was made by inspection of the conjunctivae, and final clinical assessment based on appearance of palmar creases, facial colour and conjunctivae gave results almost identical with those from conjunctival assessment alone. Occasionally, chronic conjunctivitis caused an erroneously high haemoglobin assessment to be made. [This point is of especial importance in tropical practice in which chronic conjunctivitis is so commonly encountered.] Conversely, observation of the palmar creases was the most difficult method of haemaglobin assessment as they not infrequently were thickened by manual

work or exhibited a brown pigmentation. The latter was particularly noticeable in housewives, possibly, it is suggested, a result of using washing soda and detergents. [The point concerning pigmentation is again of obvious relevance to tropical practice.] A colourless palm crease was, however, found to be indicative of a haemoglobin value of under 50%, and at levels between 55 and 75% the palm crease had often lost its normal bright colour and had become a brownish red.

It is concluded that clinical assessment of anaemia is reasonably accurate for haemoglobin values of 60% or less but that for values above this a more accurate method is required. [This is an interesting paper and draws attention to the sometimes forgotten fact that even in the field in which a variable may be assessed by clinical or laboratory means, good clinical observation can give excellent results provided that its limitations are recognized and taken into account.] *A. W. Woodruff*

American Soc. of Biol. Chemists. **Symposium on Molecular Heterogeneity of Hemoglobin** [Drabkin, D. L., Chairman]. *Federation Proc.* Wash. 1957, Sept., v. 16, No. 3, 740–73, numerous figs. [Numerous refs.]

Robinson, A. R., Robson, Margaret, Harrison, Ann P. & Zuelzer, W. W. **A New Technique for Differentiation of Hemoglobin.** *J. Lab. & Clin. Med.* 1957, Nov., v. 50, No. 5, 745–52, 5 figs.

The authors have used electrophoresis on agar gel for the separation of haemoglobins. The buffer was citric-acid–sodium-citrate, *p*H 6·0–6·2. By this method foetal haemoglobin could be easily separated from normal adult haemoglobin. This is a considerable advance over the paper electrophoresis at *p*H 8·6. On paper electrophoresis at *p*H 8·6 haemoglobins D and S show the same behaviour, but a difference could be seen by this new agar technique: D did not separate from A but S separated very well.

Another interesting observation was the finding of small amounts of haemoglobin showing the properties of haemoglobin A controls in haemoglobin samples which had come from people with sickle-cell–haemoglobin-C disease and homozygous sickle-cell anaemia. The authors state that "in the light of the possible genetic implications, these findings . . . may be the method's most valuable aspect". *H. Lehmann*

Kunkel, H. G., Ceppellini, R., Müller-Eberhard, U. & Wolf, J. **Observations on the Minor Basic Hemoglobin Component in the Blood of Normal Individuals and Patients with Thalassemia.** *J. Clin. Investigation.* 1957, Nov., v. 36, No. 11, 1615–25, 5 figs. [19 refs.]

"The minor hemoglobin component (A_2) of normal blood was readily separated from the main hemoglobin fraction by various procedures of

zone electrophoresis. In the isolated form it showed all the usual characteristics of a true hemoglobin. The shifts in the absorption spectrum obtained with various derivatives were similar to those obtained with hemoglobin A. A close resemblance in sedimentation coefficient, solubility, and immunological properties was found for these hemoglobins.

"A_2 hemoglobin was found in the blood of all of approximately 300 normal adult individuals but was absent or greatly reduced in newborn infants. A similar component was found in the blood of certain other primates, but not in other animals.

"Quantitation of the A_2 component revealed elevated levels in individuals with thalassemia. A mean level of 5·11 ± 1·36 per cent compared to the normal of 2·54 ± 0·35 per cent was obtained for a series of 34 carriers of the thalassemia trait. The highest values were obtained in two patients classified as intermediate forms of thalassemia. Children with Cooley's anemia showed considerable variation with most values falling in the normal range.

"The possible value of analyses of the A_2 component in various thalassemia syndromes and their genetic implications are discussed." [See this *Bulletin*, 1956, v. 53, 488.]

Trowell, H. C., Raper, A. B. & Welbourn, H. F. **The Natural History of Homozygous Sickle-Cell Anaemia in Central Africa.** *Quart. J. Med.* (n.s.) 1957, Oct., v. 26, No. 104, 401–22, 2 figs. on pl. [36 refs.]

Central Africa, to which Uganda geographically belongs, resembles West Africa by showing a high incidence of sickling. On the other hand haemoglobin C is commonly found in West Africa but is absent in Central Africa. Hence there is in Uganda no need to make a careful distinction between sickle-cell diseases due to the homozygous inheritance of the sickling gene and others due to the heterozygous inheritance of one gene for haemoglobin S and one for haemoglobin C. The authors discuss in some detail the difficulties experienced in Central Africa when an attempt was made to compare observations there with those reported from West Africa and North America. It is now clear that most of these differences were due to the fact that the sickle-cell disease described in West Africa and in North America included both true homozygous sickle-cell anaemia and sickle-cell–haemoglobin-C disease. The authors intend in their review "to describe the single entity, 'pure' or homozygous sickle-cell anaemia, for every patient described in the present communication was proved to possess no other variant of adult haemoglobin than haemoglobin S".

[If the diagnosis of homozygous sickle-cell anaemia is based on the presence of haemoglobin S without haemoglobin A, sickle-cell–haemoglobin-C disease may be excluded, but not sickle-cell–thalassaemia. That

sickle-cell–thalassemia should be found in Uganda is very likely because it has now been described in the Belgian Congo. While, therefore, the insistence on family study may not be so important in the general run of sickle-cell anaemias in Uganda, it becomes essential when the diagnosis of " homozygous " sickle-cell anaemia is made in conditions which do not conform to the general picture. In this investigation this applies to the observations on sickle-cell anaemia in adults.] In fact no first-hand observation of sickle-cell anaemia in a living adult is presented. The paper refers to 2 patients, aged 20 and 24 years of age respectively, described in Uganda in 1945 at a time when it was not yet known that the sickling incidence in that country was high and when, at that time not unreasonably, mere coincidence of anaemia and sickling was taken to denote sickle-cell anaemia. As further examples of sickle-cell anaemia in adults are cited 3 women described by Jacob [this *Bulletin*, 1957, v. 54, 870] where the laboratory diagnosis of " homozygosity " had not been supported by family studies and where therefore the more likely diagnosis of sickle-cell-thalassaemia had not been excluded. Lastly, a post-mortem report is presented on a 36-year-old woman who had given birth normally to a female child after which she collapsed and died suddenly. No electrophoretic analysis of the haemoglobin was made but foetal haemoglobin was present and sickling was found. The post-mortem findings resembled those seen in sickle-cell disease but it would be difficult to maintain that they should be put down to homozygous sickle-cell anaemia rather than to sickle-cell–thalassaemia or any of the other rare sickling diseases. [If there were many adult sickle-cell homozygotes in Uganda it would be possible to forgo finer details in a single case, but as this is a unique experience this could hardly be done and it is only fair to say that the authors do themselves recognize this and are guarded in their comment.]

Whereas this " natural history of homozygous sickle-cell anaemia " is not convincing for the adult range, it is most valuable as far as the study of the onset of the disorder is concerned. It was possible in no less than 4 infants to observe the development of sickle-cell anaemia. These children attended welfare clinics from birth and no departure from normal was detected clinically or in the haemoglobin content or the morphology of the blood for the first month. The earliest change observed was a fall in the haemoglobin level and an increase of polychromatic cells in the blood film. Shortly afterwards there came anaemia and an increase of leucocytes and the appearance of erythronormoblasts in the blood smear. This stage was fully developed at about the end of the third or fourth month. By then the level of foetal haemoglobin had fallen sufficiently to allow the demonstration of the haemoglobin S pattern (without haemoglobin A) on electrophoresis. Nevertheless it was difficult to differentiate between this anaemia and the haemolytic anaemia caused by malaria. During the first two years of life anaemia was seldom seen to be a predominant sign. In later childhood manifestations could be divided

into two groups: children who appeared fairly well and others who were seen because of an illness due to sickle-cell anaemia. Those who survived the earlier hazards of the onset of haemolytic anaemia and of the many diseases to which young children are exposed in Africa, suffered less severely as they became older. 4 patients were seen in the years of adolescence. They looked younger than their age and the girls had a delayed menarche.

The review discusses in detail the haematological and radiological changes. These on the whole agree with those seen elsewhere, except that perhaps there is a greater emphasis on affections of the long limb bones than as for instance described in America. The most noteworthy facts about the post-mortem findings were that the changes in spleen, lymph glands and flat bones came later than the appearance of the anaemia. At the early stage the spleen may show no iron deposits and indeed the authors noted that in Uganda the convoluted tubules of the kidney in malaria may contain more iron than those of small children with sickle-cell anaemia.

When the authors discovered a patient with sickle-cell anaemia, both of whose parents had been proved to carry the sickling gene, no advice was given concerning future pregnancies. It was considered doubtful if any advice would be accepted, and the chance of any future pregnancy resulting in a homozygous child was in any case only 1 in 4. On the other hand the chances that the child would be a heterozygote and so survive the dangers of malaria better than a normal child would be even. Tromexan was found to inhibit sickling *in vivo* as reported by Griffiths [this *Bulletin*, 1955, v. 52, 1226] but although sickling was abolished or much reduced in a child thus treated, the patient nevertheless died with signs of marrow failure.

The general picture emerging is that sickle-cell anaemia appears first as a mild disorder at about the first month of life and that the evolution of the disease becomes rapid after the age of 6 months. It is almost confined to the first 2 years of life and at this stage the most distinctive clinical sign is the affection of the long limb bones. From time to time there are severe haemolytic episodes which often cause death. After the age of 3 the deaths are less frequent. *H. Lehmann*

Went, L. N. **Incidence of Abnormal Haemoglobins in Jamaica.** [Correspondence.] *Nature*. 1957, Nov. 23, v. 180, 1131–2.

West Africans were brought to Jamaica from the sixteenth until the early nineteenth century by the slave trade. Whereas several reports have appeared in the United States on the incidence of haemoglobins S and C which are present in the West African of today, none have yet appeared from Jamaica which have dealt with both these haemoglobins rather than with sickling only.

The author has examined 1,018 pregnant women attending the antenatal clinic of University College Hospital in Jamaica. He found that 878 did not possess an abnormal haemoglobin, 106 were sickle-cell trait carriers and 30 haemoglobin C trait carriers. 2 women were suffering from haemoglobin SC disease, and 2 showed only haemoglobin S. It was possible from family studies to make sure that one of these was almost certainly homozygous, which was remarkable because she had three living children. The other showed by electrophoresis only haemoglobin S but the family study demonstrated that she was heterozygous for the sickle-cell gene and for a thalassaemia-like gene which gave rise to foetal haemoglobin levels of 24, 26 and 16% respectively in her mother, her brother and one of her children. The only other haemoglobin present in these three was haemoglobin A.

Both the incidence of sickling and of haemoglobin C are lower than in West Africa but it is noteworthy that the genes for haemoglobin S and for haemoglobin C and the thalassaemia-like gene found in West Africa could be demonstrated in this Jamaican population. *H. Lehmann*

Vella, F. **Haemoglobin H Disease.** *Proc. Alumni Ass., Malaya.* 1957, Sept., v. 10, No. 3, 174–88, 3 figs. [31 refs.]

This is probably the most comprehensive account of haemoglobin H disease yet written. It deals with the cases previously described, the clinical picture, the haematology, the genetic aspects and the chemical properties of haemoglobin H. The author himself refers to 4 cases of haemoglobin H disease he has seen in Singapore, all in Chinese patients. *H. Lehmann*

VENOMS AND ANTIVENENES

Parrish, H. M. **Mortality from Snakebites, United States, 1950–54.** *Pub. Health Rep.* Wash. 1957, Nov., v. 72, No. 11, 1027–30, 1 fig.

Parrish, H. M. **On the Incidence of Poisonous Snakebites in Florida: Analysis of 241 Cases occurring during 1954 and 1955.** *Amer. J. Trop. Med. & Hyg.* 1957, July, v. 6, No. 4, 761–5.

By means of a questionnaire sent to doctors and hospitals the author investigated the history and incidence of poisonous snake bite in Florida during 1954 and 1955.

106 bites were reported for 1954, and 135 for 1955, in a population of 100,000. There were 3 deaths in each year. Three times as many males as females were bitten, presumably because of greater occupational risk. Half the bites occurred in persons under 20 years old. Schoolchildren were the most commonly bitten. The peak of biting occurred in July to September. Rattlesnakes were concerned in half the incidents, and 5 of the 6 deaths were due to them. The bite was inflicted on the extremities more frequently than elsewhere, on the legs slightly more often than on the arms. Exceptions included one patient bitten on the forehead when peering into a box containing a " pet " rattlesnake, and another unfortunate bitten on the behind while squatting. From hospital records it appears that snakes may bite without injecting venom. It is estimated that about 40% of patients received minimal doses of venom. 20% were injected with heavy doses, but only 9 received the recommended amounts of antivenene. Morbidity was sometimes severe. Infection or gangrene led to amputation of an extremity in 3 cases and of digits in 5.

B. G. Maegraith

Habermann, E. Gewinnung und Eigenschaften von Crotactin, Phospholipase A, Crotamin und " Toxin III " aus dem Gift der brasilianischen Klapperschlange. [**Isolation and Properties of Crotactin, Phospholipase A, Crotamin and " Toxin III " from the Venom of the Brazilian Rattlesnake**] *Biochem. Ztschr.* 1957, v. 329, No. 5, 405–15, 4 figs. [33 refs.]

Bergman, R. A. M. L'anatomie de *Enhydris enhydris*. [**The Anatomy of *Enhydris enhydris***] *Riv. di Biol. Colon.* Rome. 1955, v. 15, 5–28, 7 figs. & 1 pl. [22 refs.]

Reid, H. A. & Lim, K. J. **Sea-Snake Bite. A Survey of Fishing Villages in North-West Malaya.** *Brit. Med. J.* 1957, Nov. 30, 1266–72, 3 figs.

The authors obtained records of over 100 sea-snake bites in the 10 years 1945–55. For various social reasons they consider this number of cases (102) well below the true incidence, which is probably more like 150 victims per year in the area concerned, *i.e.* about 10% of the community actually engaged in fishing. The figures for mortality are similarly obscured by the local disinclination to talk about snake bite; the true figure lies somewhere round 3%. The toxicity of the chief offender *Enhydrina schistosa* is probably equivalent to that of the Indian cobra, which suggests that the mortality figures are low, possibly because the sea snake may not always inject venom during biting.

An effective polyspecific antivenene is needed. A sea-snake station should be set up to produce it and the value of the antivenene should be widely publicized among the local population to overcome their reluctance and obtain their cooperation.

[This paper covers some of the material presented in a previous communication by Dr. Reid (this *Bulletin*, 1957, v. 54, 747). It is notable that the production of specific antivenene is advocated in this paper despite certain doubts expressed elsewhere by the senior author as to the efficacy of other antivenenes.] *B. G. Maegraith*

Anima Devi; Maitra, S. R.; Sarkar, N. K. **Action of Snake Venoms on Muscles. Part I. Physiological Action** [Anima Devi, Maitra & Sarkar]. *Ann. Biochem. & Exper. Med.* Calcutta. 1953, v. 13, Nos. 1/4, 23–6, 3 figs. on pl. **Part II. Mechanism of Action** [Anima Devi & Sarkar]. *Ibid.*, 27–30, 4 figs. on 2 pls. [10 refs.]

Wiener, S. **The Sydney Funnel-Web Spider** (*Atrax robustus*): **I. Collection of Venom and its Toxicity in Animals.** *Med. J. Australia.* 1957, Sept. 14, v. 2, No. 11, 377–83, 4 figs. [16 refs.]

Specimens of *Atrax robustus* were collected around Sydney and kept under observation in the laboratory.

Two types of bites were observed: one was a series of superficial punctures, and the other involved deep biting in which the chelicerae were fully inserted and the legs firmly grasped the bitten object. Either type of bite could produce envenomation and death.

In the act of biting the chelicerae were used "in the manner of an axe". Drops of venom often appeared on the tops of the fangs if the spider were roused into adopting its fighting position. These drops could be "sucked back" into the cavity of the fang. In biting the chelicerae were thrust downwards so violently that they could pierce the skull of a chicken.

Studies of the effects of biting revealed that fatal envenomation sometimes occurred but could not always be related to the success of the bite itself. Examination of the toxicity of the venom was therefore carried out with material obtained from dissected venom glands or venom collected (milked) from droplets which collected at the tips of the chelicerae when the spider was challenged.

The collected venom was diluted in distilled water, freeze-dried and taken up again in physiological saline, or else diluted in saline for immediate use.

The toxicity was compared by intracerebral, subcutaneous and intravenous or intracardiac injection into various animals, usually mice or guineapigs. Assay was also made on *Drosophila* flies.

Experiments on biting were made with mice, rats, rabbits, guineapigs, rhesus monkeys, a cat and chickens. Signs of envenomation and death occurred within a few hours of the bite. There were no delayed effects. Death occurred from respiratory failure. In fatal cases the body temperature was often reduced. There was no haemolysis or change in clotting time. The lungs were congested, emphysematous, haemorrhagic and oedematous. The auricles and large veins were distended.

Mice were at first thought to be resistant when bitten by female spiders, but were later found to be susceptible to the venom of male spiders. One monkey was killed by a bite from a female spider.

The collected venom was very toxic. Its effects were similar to those of the bite. Intracerebral injection into mice and guineapigs was much more effective than intravenous or subcutaneous injection. Median lethal doses in mice, for instance, were in the proportion of 1 : 80 : 260 depending on the mode of administration (in the order quoted above). Assay on *Drosophila* gave an LD50 of $0{\cdot}9 \times 10^{-6}$ mgm.

The venom of the male spider was much more toxic than that of the female, although the fangs and venom glands were smaller.

The pharmacological properties of the venom have not yet been fully examined.

In the discussion 5 fatal human cases of envenomation are mentioned. 3 were bitten by male spiders. In the others the sex of the spider was unknown. Bites in man are most commonly reported during November to March, when the spiders are known to be most active.

B. G. Maegraith

Tange, Y. Beitrag zur Kenntnis der Morphologie des Giftapparates bei den japanischen Fischen. XVI. Zusammenfassende Betrachtung über den Giftapparat. [**Morphology of the Poison Apparatus of Japanese Fish. XVI. Summary of Observations on the Poison Apparatus**] *Yokohama Med. Bull.* 1957, Feb., v. 8. No. 1, 62–82. [26 refs.]

TOXOPLASMOSIS

Belfrage, S. & Bergdahl, U. Förvärvad toxoplasmos. [**Acquired Toxoplasmosis**] *Nordisk Med.* 1957, Nov. 28, v. 58, No. 48, 1849–52. [31 refs.]

The English summary appended to the paper is as follows:—

"Eight cases of acquired toxoplasmosis, treated in the Hospital for Infectious Diseases at Malmö, are reported. All cases were diagnosed by means of serologic reactions (dye-test and complement-fixation test). All were of the lymphoglandular type described by Siim. Seven cases presented cervical lymphoglandular enlargement. Three patients had

splenomegaly. One case showed considerable enlargement of the liver, and one case presented a generalized macular rash at the onset. The most prominent finding in the blood was an absolute or relative lymphocytosis with atypical forms, resembling McKinley cells, seen in glandular fever. The Paul-Bunnell reaction was negative in seven cases and positive in one. Electrophoretic investigations in five cases showed an increase of the gamma globulins.

"Seven of the eight cases presented symptoms of an acute febrile disease with fever enduring two to three weeks. Lymphoglandular enlargement persisted for about six months and fatigue for about the same time. The course was benign in all cases."

Thompson, S. W. & Reed, T. H. **Toxoplasmosis in a Swamp Wallaby.** *J. Amer. Vet. Med. Ass.* 1957, Dec. 15, v. 131, No. 12, 545–9, 7 figs. [32 refs.]

Schuhová, Vera. Langfristige Kulturen des *Toxoplasma gondii* in He-La-Zellen. [**Long-Term Tissue Cultures of** *Toxoplasma gondii* **on He-La Cells**] *Zent. f. Bakt.* I. Abt. Orig. 1957, v. 168, Nos. 7/8, 631–6, 6 figs. [12 refs.]

The author describes a method for prolonged cultivation of *Toxoplasma gondii* in HeLa cells, which were grown in tubes containing 40% horse serum, 60% Hanks's solution, 50 units of penicillin + 50 μgm. streptomycin per ml. The tissue cultures were kept at 37°C., and the medium (1 ml. per culture tube) was renewed every 3–4 days.

A strain (CB) of *Toxoplasma* was maintained in mice, the peritoneal exudate of which was used for inoculation of cultures, from which further sub-inoculations were made with 0·1 ml. of the sediment from the medium.

It was found that, by changing the medium, small numbers of *Toxoplasma* could be kept in HeLa cell cultures for periods of up to 10 months without losing their virulence. Such cultures thus provide a convenient method for the maintenance of laboratory strains of this parasite.

The appearance of the parasitized cells in cultures is shown in a number of photomicrographs. *C. A. Hoare*

Rodríguez M., J. D. Inmunidad en cobayos inoculados con toxoplasmas muertos. [**Immunity produced in Guineapigs by Inoculation of Dead Toxoplasms**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1957, Jan.–Mar., v. 14, No. 1, 1–7. English summary.

A description is given of a method of immunization of guineapigs against toxoplasmosis by inoculation of dead parasites. For this purpose the

peritoneal exudate of 20 mice, infected with a pigeon strain of *Toxoplasma*, was washed twice in saline and brought to the original volume, after which 0·2% formol was added to the toxoplasmic suspension, and the mixture was kept at 5°C. for a fortnight.

Each of the guineapigs used in the experiments was vaccinated by subcutaneous inoculation of 1·2 cc. of a mixture containing equal volumes (0·4 cc.) of (1) the saline suspension of formalized parasites (80 million), and (2) adjuvants consisting of sterilized (a) lanolin and (b) liquid petrolatum.

A single injection of this vaccine was sufficient to protect the guineapigs against infection, as shown by failure to infect them with 10 million living toxoplasms on the 16th day after vaccination. Furthermore, the serum of the vaccinated animals reacted with high titres both to the dye- and complement-fixation tests, in which toxoplasms obtained from the peritoneal exudate of infected mice were used as indicators and antigens respectively. Although immunization in a guineapig was also produced with formalized parasites without any adjuvants, its serum revealed the presence of cytoplasm-modifying antibody alone. *C. A. Hoare*

Eyles, D. E. & Coleman, Nell. **An Evaluation of the Effect of Sulfones on Experimental Toxoplasmosis in the Mouse.** *Antibiotics and Chemotherapy.* New York. 1957, Nov., v. 7, No. 11, 577–85. [17 refs.]

The value of sulphonamides and sulphones in protecting mice against infections with *T. gondii* has been known for some time [this *Bulletin*, 1943, v. 40, 638; 1950, v. 47, 407; 1951, v. 48, 837; 1952, v. 49, 1158; 1956, v. 53, 366, 367]. The present authors have attempted to evaluate the sulphones in treatment and compared the results with those obtained with sulphonamides. The NR strain of *T. gondii* was used in mice as previously described [*ibid.*, 1956, v. 53, 366, 367]. Drugs were given for 2 weeks in diet starting just after intraperitoneal inoculation with 20,000 organisms, in the early screening tests. The length of prolongation of life over that of untreated controls was noted. Drugs of promise were then used to treat mice in groups of 12, with logarithmically related doses under the same conditions as before. Studies on dose-effect were based on the proportion of mice which survived the 14-day treatment. Comparison was made of the activity of 4:4′diaminodiphenylsulphone and of derivates substituted in the amino group including Diasone, Promin, Sulphetrone [solapsone] and the others whose formulae are given. 14 other substances were also tested.

The activity of sulphones against *T. gondii* infections was confirmed but cure was effected only irregularly and in this respect better results were obtained with sulphonamides. A synergic effect was observed

between 4:4′-diaminodiphenylsulphone and pyrimethamine, such as exists between the latter and sulphonamides [*ibid.*, 1953, v. 50, 980].

J. D. Fulton

DERMATOLOGY AND FUNGUS DISEASES

de Vries, G. A. & van der Hoeven, L. H. **Report of a Case of Black Grain Maduromycosis of the Foot caused by an Aberrant Strain of** *Madurella mycetomi* **(Laveran) Brumpt on Curacao, Netherlands Antilles.** *Mycopathologia.* The Hague. 1957, Dec. 20, v. 8, No. 4, 253–9, 3 figs.

Harris, J. S., Smith, J. G., Jr., Humbert, W. C., Conant, N. F. & Smith, D. T. **North American Blastomycosis in an Epidemic Area.** *Pub. Health Rep.* Wash. 1957, Feb., v. 72, No. 2, 95–100, 1 chart.

An outbreak of 10 cases of North American blastomycosis (*Blastomyces dermatitidis*) in 1953–54, confined to a small locality in Pitt County, North Carolina [Smith *et al.*, this *Bulletin*, 1955, v. 52, 1140], provided the opportunity for an epidemiological survey on the infection. In this survey, conducted from 12–16 April 1954, 1,648 persons of all ages, living within a 4-mile radius of the site of the outbreak, were examined by means of skin sensitivity tests for blastomycin, histoplasmin and tuberculin, by the blastomycosis serum complement-fixation test, and by miniature radiography of the lungs. The allergen used in the blastomycin skin test was not the usual kind of mycelial culture extract, but a whole-cell suspension or " vaccine " of the yeast phase culture of *B. dermatitidis*.

Of the persons tested for specific skin sensitivity, 2·9% were found to be blastomycin-positive, 6·4% histoplasmin-positive and 25·6% tuberculin-positive. 11 reacted to both blastomycin and histoplasmin, and 27 who were blastomycin-positive gave minimal reactions to histoplasmin, but in 6 of these the blastomycin reaction showed 10 mm. of induration. Of 77 who were histoplasmin-positive and blastomycin-negative, 32 gave histoplasmin reactions with more than 10 mm. of induration. These observations do not support the widely-held view that cross sensitivity to blastomycin and histoplasmin is common.

From the blastomycosis complement-fixation test on serum from 1,275 persons, 43 positive results were recorded, but 21 of these showed serum titres of only 1 in 1 or 1 in 2; 9 reacted to a titre of 1 in 4, 8 to 1 in 8, 4 to 1 in 16 and 1 to 1 in 32. The results of these serological tests showed no correlation with those of the skin sensitivity tests, and their significance is not yet clearly understood.

The radiological examinations of the lungs revealed nothing of importance, except in one patient who was found to be suffering from active pulmonary tuberculosis.

No instance of cutaneous or pulmonary blastomycosis was discovered.

J. T. Duncan

CORNBLEET, T. **Thyroid-Iodide Therapy of Blastomycosis.** *Arch. Dermat.* 1957, Nov., v. 76, No. 5, 545–8.

For nearly half a century, iodides have been a sheet anchor in the therapy of the deep mycoses, not because of their general effectiveness but rather because of the apparent absence of suitable alternatives. Potassium iodide, administered in large doses, has proved successful in the treatment of many cases of the cutaneous form of North American blastomycosis, although it has no significant antifungal action against the causative fungus, *Blastomyces dermatitidis in vitro*, and it has not proved effective in the deep, systemic form of the disease. The therapeutic action of iodides on mycotic granulomata is not well understood, but the present author considers that it is connected with the thyroid function. Thyroid gland insufficiency, manifested by goitre, may be caused by a number of conditions which give rise to an increased demand for essential iodine without increasing the supply. The deep mycoses may, perhaps, act in this way, and it seems rational when repairing the iodine deficiency by administration of potassium iodide to add thyroid extract. An early experimental treatment in which the antithyroid agent, propylthiouracil, was administered with potassium iodide, had a nearly disastrous result, which bears out the importance of the thyroid hormone in this treatment.

9 patients with blastomycosis, 7 with the cutaneous form and 2 with the systemic disease, were given combined treatment with potassium iodide and thyroid extract, and all were clinically cured. The daily dosage commenced with 15 drops of saturated solution of potassium iodide, thrice daily, with meals and one dose of thyroid extract 0·065 gm. daily. Every 5th day, the dose of thyroid was increased by 0·065 gm. and iodide by 12 drops per day, until the limit of tolerance was reached. The patients usually took from 0·259 to 0·518 gm. of thyroid extract and from 50 to 100 drops of the iodide solution daily. There were no untoward effects from the treatment, but the maximum dose of thyroid must be controlled by observation of the heart rate and the general physical state; an increase of 15 pulse beats per minute is allowable or 20 beats if a patient with the systemic disease is improving. Weekly blood examinations and records of body weight should be made, and a rich protein diet given.

During the first 3 weeks of treatment there is little observed change in the disease, then the cutaneous lesions begin to resolve and the smaller patches are healed within 6 weeks. The systemic lesions require longer treatment—not less than 6 months, but with substantial improvement the dosages may be reduced.

Administration of thyroid extract enhances the effects of iodide in blastomycosis, but available data are not sufficient to show how this is brought about. Further experimental studies are contemplated, particularly on the thyroid uptake of iodine in the presence of deep mycotic infection. *J. T. Duncan*

Drouhet, E. & Wilkinson, R. Activité thérapeutique de l'amphotéricine B dans la blastomycose expérimentale. [**Therapeutic Activity of Amphotericin B in Experimental Blastomycosis**] *Ann. Inst. Pasteur.* 1957, Nov., v. 93, No. 5, 631–46, 5 figs. [10 refs.]

Tests of fungistasis *in vitro* showed the new antifungal antibiotic amphotericin B (a heptane) to be effective against the mycelial phase of *Blastomyces dermatitidis*, at a concentration of 0·1 μgm./cmm. in a liquid medium, and against the yeast phase at 0·7 μgm./cmm. in a brain-heart-cystein-blood agar medium. Amphotericin A (a tetrane) similarly tested was only weakly active in this respect.

Therapeutic tests, *in vivo*, were made with amphotericin B on mice and hamsters infected by intraperitoneal injection of *B. dermatitidis*. In the first experiment, mice were used and the treatment was given by subcutaneous injection of the antibiotic in doses of 2 mgm. daily. In one group of the animals (a) the treatment started a day before infection and continued for 6 days, in another group (b) it started immediately after infection and continued for 5 days. The experiment ended 21 days after infection, and all surviving animals were killed. The mortality rates were 33% in group (a), 30% in group (b) and 60% in untreated control animals. At necropsy the untreated animals showed the gross lesions of generalized blastomycosis, and the fungus was easily recovered in culture from their organs. In contrast, the treated animals, even those which died at an early stage of the experiment, generally did not show gross lesions of blastomycosis in their organs, and the fungus was only occasionally recovered from them in culture. The early deaths of such animals is attributed to an acute toxic effect due to destruction of the inoculated fungal cells by the antibiotic.

A second experiment was conducted on similar lines, but both mice and hamsters were used and treatment was conducted at a dose of only 1 mgm. daily, and over a longer period. In this experiment, 100% of the treated hamsters and 50–60% of the treated mice survived the 27 days of the test, whereas all the untreated animals died. In general, there were few gross signs of the disease in the treated animals, but the fungus was isolated in culture from some, particularly the hamsters which had received relatively smaller doses of the antibiotic. In all these animals treated by subcutaneous injection, there was a local reaction and a yellowish deposit of amphotericin B in the site of injection, so that much of the antibiotic was not effective.

In a third experiment, mice were used and the antibiotic was given by mouth in the drinking water, so that each mouse would take in about 2 mgm. of amphotericin B daily. One group of mice received treatment for 3 days before infection and the other group from the time of infection.

Some animals in the treated groups died spontaneously and others were killed off at daily intervals from the 19th to 31st day. All of the untreated animals died with gross signs of the disease, but among the treated animals which died, lesions were rare and usually trivial. From only one animal among the treated mice was the fungus recoverable in culture. In a further experiment various combinations of amphotericins A and B and nystatin were used, but only amphotericin B was found effective; the mortality rate in animals treated with amphotericin A was 100% and in those treated with nystatin 87–90%.

Amphotericin B is effective in the treatment of experimental blastomycosis in mice and hamsters, particularly when administered by mouth. It was not toxic at the dosages used. *J. T. Duncan*

HARRELL, E. R. & CURTIS, A. C. **The Treatment of North American Blastomycosis with Amphotericin B.** *Arch. Dermat.* 1957, Nov., v. 76, No. 5, 561–8, 8 figs. [22 refs.]

Notwithstanding the success achieved in the treatment of North American blastomycosis, particularly in its cutaneous form, by the aromatic diamidines stilbamidine and 2-hydroxystilbamidine [SUTLIFF *et al.*, this *Bulletin*, 1954, v. 51, 1295], ultimate failure of the treatment, after initial clinical improvement, has been reported in many cases of the systemic form of the disease [HARRELL *et al.*, *ibid.*, 1956, v. 53, 492]. Failure in such cases may be associated with an unsatisfactory immunological state of the patient manifested by absence of cutaneous sensitivity to blastomycin and by the presence of a high or persistent titre of the specific complement-fixing antibody in the blood.

In the present study, the new antifungal antibiotic, amphotericin B (Squibb & Co.), which is fungistatic to *Blastomyces dermatitidis in vitro*, was used for the treatment of 4 selected cases of systemic blastomycosis which had proved resistant to treatment by stilbamidine and 2-hydroxystilbamidine, after an initial good response. All 4 patients showed the unsatisfactory immunological state referred to above, and all had cutaneous as well as pulmonary lesions; the osseous system was involved in 2, the prostate in 1, the oral mucosa in 1, 1 patient had bilateral pulmonary cavitation and 1 was in a moribund state when treatment with amphotericin B was started.

Amphotericin B, which is only slightly soluble in water, was given intravenously in doses of 50 mgm. suspended in 1,000 ml. of 5% dextrose solution; the infusion being given slowly over a period of 6–8 hours. The antibiotic was administered daily, when feasible, and the total dosage

given was 1·0 gm. in 3 of the patients and 0·5 gm. in the remaining patient. Such toxic symptoms as fever, nausea, vomiting and anorexia occurred during the infusion, but tended to diminish with the course of treatment. The febrile reaction was controlled, to some extent, by the daily administration of 15 mgm. of prednisolone, and chlororomazine (Thorazine) was used to control the nausea. The anorexia tended to persist for a long time after cessation of the treatment. The results of treatment with amphotericin B in these 4 cases were excellent, the cutaneous lesions usually healing in about 3 weeks from the start of treatment, the general state of health improved and lost weight was regained. The causative fungus was no longer to be found, and the osseous and pulmonary lesions, although still evident in X-ray pictures, were arrested. These results are very encouraging, but caution is advised in evaluation of the treatment until the patients have been free from detectable disease for a longer period. A new soluble preparation of amphotericin B is now available from the makers and has been tested on a fifth patient, resistant to the diamidines, with excellent results. This case is not included in the present report. *J. T. Duncan*

Vogel, R. A., Peace, R. J. & Koger, M. T. **Histopathologic Reactions of the Yolk Sac Tissue of Embryonated Hen's Eggs to** *Coccidioides immitis*. *Amer. J. Path.* 1957, Sept.–Oct., v. 33 No. 5, 1023–33, 7 figs. on 4 pls. [10 refs.]

In previous reports, Vogel and Conant [this *Bulletin*, 1952, v. 49, 798; 1953, v. 50, 62] described the development of the parasitic sporangial form of *Coccidioides immitis* in the yolk sac of the developing chick embryo, from an inoculation of the saprophytic arthrospores of the fungus directly into the sac. The survival time of the embryo after such an inoculation varied greatly, and the present study was undertaken to ascertain whether the fungus remained in the liquid yolk or actually invaded the tissue of the yolk sac.

A suspension of arthrospores from a 3-month-old culture of *C. immitis* was washed in brain, heart infusion broth, then adjusted to the opacity of the No. 9 tube of the MacFarland nephelometer; 0·5 ml. of this suspension was injected directly into the yolk sac of a 13-day-old, incubating chick embryo and incubation was continued at 37°C. Vacuolated parasitic spherules of the fungus could usually be found in the yolk after 72 hours, and at the end of 4–5 days mature sporangia and free endospores could be demonstrated. On the 5th–6th day, small pieces of yolk sac tissue were cut out, fixed and sectioned for histological examination. These sections showed definite invasion of the yolk sac tissue by the fungus, which provoked 2 types of tissue reaction. The more striking was the development of miliary granulomata formed of endothelial and

histiocytic elements with occasional multinucleate giant cells of the foreign body type, derived from the primitive blood vascular system. These granulomata, found in the peripheral tissue fronds of the yolk sac membrane, were seen to arise from the endothelium of the capillary loops of the developing blood vessels in which emboli of the fungal endospores had been arrested. Other spherules, which were free in the capillary loops had not yet provoked this inflammatory reaction. Liquefaction necrosis of free and fixed tissue elements was a definite but not prominent feature of some granulomata. In the other tissue reaction, which was less typical of this infection, segments of blood vessels showed endovasculitis and perivasculitis with few or no identifiable fungal elements present. These lesions were not mechanical and appeared to be of humoral or chemical aetiology. *J. T. Duncan*

Smith, C. E., Saito, Margaret T., Campbell, Charlotte C., Hill, Grace B., Saslaw, S., Salvin, S. B., Fenton, Jane E. & Krupp, M. A. **Comparison of Complement Fixation Tests for Coccidioidomycosis.** *Pub. Health Rep.* Wash. 1957, Oct., v. 72, No. 10, 888–94, 1 graph.

The complement-fixation reaction is of established value as a qualitative test for the diagnosis of coccidioidomycosis [see Smith *et al.*, this *Bulletin*, 1956, v. 53, 929], and the quantitative determination of the complement-fixing antibody provides a basis for prognosis in the disease. However, variation of the technique used for the test may influence the end-point or quantitative reading.

At the University of California Laboratory (UCL) the time allowed for complement-fixation in the original standard test was 2 hours at 37°C., but in a recent modification of the test, the fixation time was altered to 18 hours at 4°C. which had the effect of raising the reaction end-point by one serial serum dilution. Other laboratories also employ modifications of the original UCL method, and, as it is desirable that results of the test from all sources should be comparable, a study was made to correlate the quantitative determinations obtained from 5 different technical methods employed in 4 laboratories, including the UCL. In the Rocky Mountain Laboratory (RML) the fixation time allowed was 1 hour at 37°C.; at the Fort Miley Hospital (FMH) it was 18 hours at 4°C. but 4 units of complement were employed as against 2 units at UCL and RML, and in the Army Medical Service School (Army) it was similar to the FMH method, but 3 units of complement were used. In the last 2 laboratories the end-point was a 50% reaction read after 30 minutes at 37°C. and in the other laboratories a 100% reaction read at the end of 60 minutes.

Comparative tests, with all 5 methods, were made on 206 selected samples of human serum from cases of coccidioidomycosis. The results of these tests showed that by comparison with the original UCL standard

technique, the later UCL, the RML and the FMH methods all gave an apparent 2-fold increase in antibody titre, and the Army method a 5-fold increase. When the results of the 4 newer methods were adjusted to equivalence with the original UCL method, a remarkable degree of agreement was shown.

In tests made on serum from 3 distinct forms of the disease—the primary, disseminated and chronic pulmonary forms—the results from the 5 methods, when adjusted to equivalence and plotted on a graph, were in close agreement, and the curves formed a distinctive pattern for each form of the disease.

In prognosis, a complement-fixing antibody titre of 1 in 16 or over, by the original UCL standard test, is an unfavourable sign, the gravity of which increases with a rising titre. The equivalents of this critical titre of 1 in 16 are: UCL new method 1 in 32, RML 1 in 32, FMH 1 in 32 and Army 1 in 80.

A standardized positive serum for the test is very necessary and as lyophilized rabbit immune serum [this *Bulletin*, 1956, v. 53, 806] is not available in sufficient quantity, a commercial immune horse serum has been prepared.

Further studies, on similar lines, embracing 8 additional laboratories, are in progress. *J. T. Duncan*

Casavilca Rubio, A. La blastomicosis Sudamericana en el Perú. [**South American Blastomycosis in Peru**] *Rev. Méd. Peruana.* 1956, Jan.–Dec., v. 27, No. 325, 610–56, 15 figs. [77 refs.]

This is a review of 18 cases of South American blastomycosis reported in Peru between 1937 and 1955. In an appendix, the author refers to 5 additional cases.

The first case of the disease diagnosed in Peru was reported by Weiss in 1937, the next 3 in 1948, one each in the years 1949, 1950 and 1951, 3 in 1952, 6 in 1954 and 2 in 1955. The first 9 were reported by Weiss and the last 5 by Casavilca.

The ages of the 18 patients were from 12 to 66 years; 16 were males and 2 females; 12 were half-breeds, 5 of the white race and 1 an Indian. All were engaged in some form of forestry or agriculture or in handling the products of these industries, and all had lived in the hilly country and its forests where the infection is presumed to have been contracted.

The presenting lesions were glandular in 6, oral in 9 and pulmonary in 3 of the patients, and the clinical type of the disease was lymphatico-viscero-mucosal in 9, lymphatico-visceral in 3, lymphatico-viscero-cutaneo-mucosal in 3, tegumentary-mucosal in 2 and glandular in 1. The diagnosis was based on the history and clinical features of the case, including the radiological findings, and on the mycological evidence from smears or sections from the lesions examined microscopically, and by

culture of *Paracoccidioides brasiliensis* obtained directly on peptone glucose agar or on blood agar, or indirectly by inoculation of the morbid material intratesticularly into a guineapig and subsequent recovery of the fungus in culture from the animal. The characters of the fungus in culture and in the tissues of the infected animal are described. The paracoccidioidin skin sensitivity test was performed on 3 of the patients with positive results in all 3.

4 of the patients died without treatment and one, owing to a diagnosis of leprosy, was not treated for blastomycosis. The remaining 13 were given sulphonamide therapy with sulphadiazine and sulphathiazole, at a daily dosage increasing from 1 gm. to 8 gm. Of these patients, 5 showed improvement, 4 were clinically cured and 4 were completely cured.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

Ponghis, G. Quelques observations sur le rôle de la mouche dans la transmission des conjonctivites saisonnières dans le Sud-Marocain. [**Observations on the Role of Flies in the Transmission of Seasonal Conjunctivitis in Southern Morocco**] *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 5, 1013–27, 10 figs.

Control of seasonal epidemic conjunctivitis may be attempted by the use of antibiotics during the epidemic season, sulphonamides prior to it, and fly control. This paper reports primarily on fly incidence in southern Morocco in relation to this condition and the effects of fly control.

In the period July to November (1954) 4 insecticide treatments were necessary: 2 treatments of DDT, followed by chlordane, and the fourth treatment of a Diazinon-DDT mixture as a residual spray on walls, etc., supported by chlordane and gamma BHC applications to manures and excrement. Chlordane was best for kill and persistence. These operations were carried out in one group of several villages. In another group a beginning was made to public education in sanitary methods and construction of latrines, these being particularly the source of *Musca sorbens*.

Fly numbers are estimated from trap catches weekly. In control villages, *M. domestica* was most common, with maximal numbers in spring and autumn. *M. sorbens* was generally 1% of the fly population with, however, a single peak season (October) when it comprised about 30% of the flies. The series of treatments gave a significant reduction of flies, gamma BHC applications to human excrement being important in effecting a fall in numbers of *M. sorbens*.

Fly reduction was accompanied by a diminution in the incidence of conjunctivitis. *M. sorbens*, although the less abundant fly, is particularly attracted to the eyes of children; it was not possible to be certain of the

relative importance of this fly compared with the abundant *M. domestica*. The greatest fall in incidence of conjunctivitis was in children 8 to 15 years old; younger children, who tolerate particularly large numbers of flies about their eyes, were slower to show benefit from fly control.

Environmental sanitation is emphasized as a necessary part of the control of conjunctivitis by fly reduction. *D. S. Bertram*

MANN, Ida. **Report on Ophthalmic Findings in Warburton Range Natives of Central Australia.** *Med. J. Australia.* 1957, Oct. 26, v. 2, No. 17, 610–12.

An account is given of the investigation of the ophthalmic condition of 438 caste and full-blood indigenous people of the Warburton Range area, central Australia.

Trachoma, though widespread, is not severe, healing spontaneously in the majority of cases. In 62% of cases of trachoma the condition was in the active and infectious stage. The total infection rate of the population was 77%.

There were no ocular signs of malnutrition. Certain diseases common among white persons were not encountered—*e.g.*, styes, myopia, convergent squint, glaucoma, and colour blindness. Apart from trachoma, the ocular condition of the people was good.

Detailed results, in age-groups, are shown in 4 tables. *D. P. Choyce*

MANN, Ida. **Probable Origins of Trachoma in Australasia.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 6, 1165–87, 8 figs.

The history of trachoma in Australasia is reviewed; it is suggested that the disease was not originally endemic in the area, but that it was introduced by European and Chinese settlers, first into Australia and later into New Guinea. From surveys undertaken by the author, and also from those made by others during the past 10 years, it is concluded that "pure trachoma" exists all over the area and is still spreading inland from the coast, and that it is converted into the serious type of the disease by secondary infection and mechanical irritation.

The incidence and results of surveys are described at length and shown in detail in 8 tables and 8 figures. *D. P. Choyce*

See also p. 300, LAGRAULET *et al.*, Lésions histologiques du segment postérieur dans un cas d'onchocercose oculaire. [**Histological Lesions of the Posterior Segment in Ocular Onchocerciasis**]

TROPICAL ULCER

KARIKS, J. **Tropical Ulcer amongst the Natives of New Guinea.** *Med. J. Australia.* 1957, Sept. 7, v. 2, No. 10, 346–50, 1 fig.

The author gives a clear description of tropical ulcer as seen among the indigenous population of New Guinea. He defines the condition as follows: "Tropical ulcer is an acute, specific inflammatory, ulcerative process, involving the skin and the subcutaneous tissues, with characteristic adherent, foul-smelling slough overlying a soft, very tender and easily bleeding granulomatous base with surrounding oedema, caused by spirochaetes and fusiform bacilli. If it is neglected, this process spreads quickly to involve also the underlying tendons and muscles, and if it is further neglected, even bones. If the process is only partly arrested, the ulcer becomes secondarily infected, and it may develop into a chronic, non-specific ulcer indistinguishable from indolent ulcers resulting from other causes."

In all the 50 cases discussed, fusiform bacilli were found in the deep layers of the slough or in the inflamed tissue below. In 43 there were both fusiform bacilli and spirochaetes. In chronic secondarily infected ulcers these organisms are rarely found but there are all kinds of others.

Predisposing factors include trauma in nearly all cases. Hygiene is important, or rather, lack of it. "It is no secret that the sufferers . . . are also the dirtiest people of the village." There was a steep increase in admissions to hospital in the rainy season and ulcers were more prevalent in hot humid areas than in the highlands. The common site of the ulcer, on the lower part of the leg, suggests that poor local blood circulation is an aetiological factor. Ulcers occur only occasionally on other parts of the body. Only one ulcer appears as a rule at any one time. There is no evidence that malnutrition is involved in the development of ulcers in New Guinea. "Amongst the native population of New Guinea there is no malnutrition", nor is hypoproteinaemia a factor involved; total protein in over 70 patients examined was 7·5 gm.% or higher. In 6 patients there was an increase in both beta and gamma globulins.

All age-groups are affected, but ulcers are rare in children under 5 and in the old. Males are affected more than females in cities and plantations, but the sex incidence is equal in the villages. The condition is commoner in rural than in urban areas.

The author says the most characteristic symptom of tropical ulcer is the nauseous smell. The acute ulcer is covered by grey phagedaenic slough from which liquid runs down the leg, attracting hordes of flies. Pain may be intense. There is oedema around the ulcer, but seldom any lymphangitis or involvement of the regional glands. General health is not impaired.

Differential diagnosis includes separation from furunculosis, gangrene, and especially tertiary yaws. Lesions caused by local varicose veins are "practically unknown" in New Guinea.

Treatment should aim at checking the infection and promoting healing. After many trials, the author has standardized his routine as follows. The patient is admitted to hospital. If the ulcer is acute, 300,000 units of procaine penicillin are given intramuscularly and repeated next day if considered necessary. The slough is removed and the ulcer is cleaned thoroughly with a dry cotton wool swab. The whole area including the surrounding skin is painted with 2% gentian violet in alcohol and covered with lint. The cleansing and painting are repeated the following day. After some days an ointment is applied daily, consisting of zinc oxide, bismuth subgallate, Vaseline, each 100 parts; balsam of Peru and lanoline 50 parts each; liquid paraffin to make a paste. Healing takes 1 to 4 weeks, during which time care must be taken to avoid secondary infection or maceration of the affected tissues by contact with water.

Treatment of chronic ulcers is similar. Skin grafts are sometimes necessary.

Prophylaxis is important. Personal hygiene and cleanliness are essential, especially in regard to minor injuries.

[This is an interesting and useful account of the practical approach to tropical ulcers. The abstracter is unable to agree with some of the points raised in discussion of differential diagnosis, especially with regard to the descriptions of yaws lesions. The statement that " Ulcers caused by yaws heal very slowly on tropical ulcer treatment, and heal smoothly if yaws treatment is initiated ", seems a little surprising when the former method included up to 600 mega-units of penicillin in 2 days.]

B. G. Maegraith

MISCELLANEOUS DISEASES

De Smet, M. P. La valeur de la ponction-biopsie du foie pour la clinique au Congo. Une analyse de 655 ponctions chez 480 patients. [**The Clinical Value for the Belgian Congo of Puncture Biopsy of the Liver. An Analysis of 655 Punctures on 480 Patients**] *Bruxelles-Méd.* 1957, Nov. 10 & 17, v. 37, Nos. 44 & 46, 1639–51; 1737–51, 6 figs. [38 refs.]

The 2 articles give a detailed account of experiences with liver biopsy obtained in Yangambi in the Belgian Congo. 480 patients were examined, many of them more than once. The author discusses fully the various applications of liver biopsy, which on the whole are the same in the tropics as they are in temperate climates. There are a larger number of patients with primary cancer of the liver. In 16 instances, where the diagnosis was confirmed post-mortem (15 epithelioma and 1 sarcoma), it was impossible to arrive at a diagnosis from biopsy on 4 occasions and 2 biopsies demonstrated only necrosis and cirrhosis, findings which, however, are often associated with an epithelioma. Biopsy of 1 patient showed

only granulation tissue [the inflammatory infiltration associated with the sarcoma]. On 3 occasions when carcinoma had been clinically suspected it could be excluded by the finding of hepatoma, tuberculosis and an inflamed colon growing into the liver. These 3 cases were further confirmed by laparotomy.

The author considers the biopsy to be a more reliable guide to the diagnosis of cirrhosis than liver function tests. Most tests for the serum lability are based on the high globulin content of the serum in liver disease and, of course, in the African the gamma globulin is about 3 times as high as that of the European. On the other hand, the African has about 30% albumin as opposed to 60% in the European [here the article has a misprint "globulin" instead of "albumin"]. Similarly, the bromsulphthalein test is influenced by extraparenchymatous factors. Malaria and cardiac cirrhosis may cause an increased bromsulphthalein retention, the first presumably because of an increased retention by the reticulo-endothelial system and the second because of stasis in the liver circulation. The only liver function test the author finds reliable is a strongly positive Takata-Ara test.

[It is impossible to review these 2 articles fully and the reader is referred to the original where he will also find excellent reproductions of the histological results.] *H. Lehmann*

Shah, K. U. & Dhown, I. K. **Scleroma of the Nose and the Pharynx (a Brief Review with a Case Report).** *J. of J.J. Group Hosps. & Grant Med. College.* Bombay. 1957, Oct., v. 2, No. 4, 343–51, 3 figs. [23 refs.]

PARASITOLOGY: GENERAL

Zembrzuski, K. Badania masowe parazytofauny przewodu pokarmowego człowieka w Polsce (rok 1954). [**Mass Investigation of Human Intestinal Parasites in Poland, 1954**] *Przegląd Epidemiol.* Warsaw. 1957, v. 11, No. 3, 297–306.

The English summary appended to the paper is as follows:—

"Coprological examinations of 30,076 persons in several areas of the country were carried out. The following parasites were found: Taenia solium, Taeniarhynchus saginatus [Taenia saginata], Hymenolepis nana in 2‰, Ascaris lumbricoides in 52‰, Trichuris trichiura in 116‰, Enterobius vermicularis in 200‰, Giardia lamblia [*intestinalis*] in 51, the latter among 21,489 examined persons.

"The distribution of various kinds of parasites in 7 Districts, in town- and country-areas was established.

"Some parasites were prevalent in certain age-groups. Cestoda,

Ascaris, Trichuris in the 14–18th, Enterobius in the 7–14th, Giardia lamblia in the 0–3 age-group.

"The Nematoda prevailed among country-people, the Cestoda and Giardia lamblia among inhabitants of the towns."

Ulewicz, K. & Wysocka, Felicja. Badania nad biocenozą flory i fauny jelitowej u dzieci w wieku przedszkolnym. [**Investigations on the Intestinal Flora and Fauna in Children of Kindergarten Age**] *Przegląd Epidemiol.* Warsaw. 1957, v. 11. No. 3, 287–95. [52 refs.]

The English summary appended to the paper is as follows:—

"In order to investigate the possible relations between the intestinal flora and fauna in children of pre-school age, microbiological and parasitological examinations of the faeces in 246 children from creches and kindergartens as well as in 60 adults from the staffs were carried out three times. These investigations were accompanied by certain clinical observations.

"Parasitic invasion was ascertained in all in 48·1% of cases (46·1% in children, 54·7% in adults). Invasion by *Entamoeba coli* takes first place, then *Enterobius vermicularis*, *Trichuris trichiura*, and mixed invasions. In microbiological investgations, the O 111 B4, O 55 B5 and O 26 B6 strains of *Escherichia coli* were isolated in 5·2% of cases, and in addition other variants of *B. paracoli*, *Proteus*, and *Klebsiella friedländeri*.

"In subjects affected by protozooic invasion, the appearance of ***Escherichia coli*** with capsular antigen was ascertained. In a certain number of cases, discrete intestinal symptoms were observed in those affected with parasites, or the simultaneous invasion of *Entamoeba coli* and *Escherichia coli* with capsular antigen."

Gelfand, M. **The Parasitic Diseases of Man in Africa.** *South African Med. J.* 1957, Nov. 9, v. 31, No. 45, 1137–43. [22 refs.]

This is a discursive paper dealing with many different aspects of human parasitic infections in Africa. They may be grouped into two classes, those which are widespread and those focally distributed, and certain anomalies of distribution are mentioned. Sites of election are briefly discussed with reference to ecotones and "habitat niches" [this *Bulletin*, 1957, v. 54, 232]. The reasons for the disappearance of a disease or its reappearance sometimes remain puzzling; tropical ulcer and tropical myositis were among the most serious diseases in Livingstone's time, and now are met only in isolated foci. The parasitic diseases often differ from many non-parasitic diseases in failing to produce specific histological changes. The pathology of a disease and its clinical picture may vary according to the derivation of the subject, the season and the district. The common occurrence in the African of simultaneous infection with two or more parasites makes it difficult to correlate symptoms with a particular infection.

A section is devoted to tolerance and immunity in the African, and their relationship to nutritional status is briefly discussed. The clinical picture of the main parasitic diseases is determined by complicated immune processes. In the complex causing African ill-health malnutrition is probably the most important single factor, and the view is expressed that parasitism is less important as a cause of malnutrition than was previously thought. In order to maintain resistance to superinfection it may be important not to eradicate a parasite but to control it at a sub-clinical level by treatment. The author states that in his experience malaria rarely kills the African infant and may not even be an important cause of morbidity. Breaking the cycle of transmission at any point will prevent infection; to illustrate this it is pointed out that the European is protected from close contact with many parasitic diseases by living in a European type of house.

[This paper is enriched by examples drawn from the author's wide clinical experience. It raises many interesting subjects for investigation and illuminates some aspects of parasitism that are often overlooked.]

T. H. Davey

HUANG, Wen-Hsien, CHIU, Jui-Kuang & KAO, Chih-Tien. **The Incidence of Intestinal Parasites among the Elementary School Children in Taitung Prefecture, Taiwan.** *J. Formosan Med. Ass.* 1957, June, v. 56, No. 6, 283–4.

The authors examined direct smears of single stool specimens of 1,706 schoolchildren in 4 rural areas of the Taitung Prefecture, Taiwan (Formosa). The children were aged 6 to 15 years; 972 were Formosans and 734 were Aborigines. The results are shown in 2 tables.

Intestinal parasites were found in 92·4%, of which 1·7% carried protozoa only and 72·7% helminths only; mixed infections amounted to 18%.

The total percentage of protozoal carriers was 19·7% and of helminth carriers 90·7%. There were certain differences between the 2 racial groups in respect of the relative incidence of different species of some of the parasites and these are reflected in the tables.

It is noted that *Ascaris* infection has decreased markedly since reports in 1926–1930 when it was 92·5%, but it is still very high, 73·6%. Several of the other helminth infections have however increased in incidence.

H. J. O'D. Burke-Gaffney

MCGILL, R. J. & GOODBODY, R. A. **Sarcosporidiosis in Man with Periarteritis Nodosa.** *Brit. Med. J.* 1957, Aug. 10, 333–4, 1 fig. [15 refs.]

The authors describe what they state is the eighteenth human case of sarcosporidiosis. It occurred in a man aged 60 who after an illness lasting

just over a year died of progressive heart failure. The illness was associated with paralysis of limbs and dyspnoea; a biopsy of a pectoral muscle revealed the presence of sarcocysts at least 1 mm. in length, while the complement-fixation test of Awad and Lainson [this *Bulletin*, 1955, v. 52, 84] was positive at 1 in 32.

A post-mortem examination showed the presence of an enlarged heart with a granulomatous condition of the walls, and numerous infarcts in the kidney, brain and lungs, the result apparently of a periarteritis nodosa. It is suggested that the latter condition is an allergic reaction following rupture of the sarcocysts. Attempts to infect mice with muscle and cardiac vegetations failed. *P. C. C. Garnham*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Bidlingmayer, W. L. & Schoof, H. F. **The Dispersal Characteristics of the Salt-Marsh Mosquito,** *Aedes taeniorhynchus* **(Wiedemann), near Savannah, Georgia.** *Mosquito News.* 1957, Sept., v. 17, No. 3, 202–12, 2 figs.

The principal breeding grounds of *Aëdes taeniorhynchus* lie in the higher salt marsh levels, and are associated with the presence of salt marsh grasses. The mosquitoes were marked with radio-active phosphorus, added as $H_3{}^{32}PO_4$ (50 microcuries per litre of water) to the breeding trays containing third and fourth stage larvae. Approximately two million larvae were reared from eggs and tagged. Over 90% of the specimens were *A. taeniorhynchus*, and the rest *A. sollicitans*. Monitoring adults bred from these larvae gave counts of 1,500 to 4,500 CPM [counts per minute] for male mosquitoes, and 6,000 to 12,500 CPM for female mosquitoes. The marked adults were allowed to emerge in their normal habitat, and most emerged during a period of 2 days.

Collecting was done with New Jersey light traps spaced as regularly as possible around the emergence point, and up to 20 miles away. Marked specimens were captured at 39 out of 93 collecting stations. Only marked *A. taeniorhynchus* were captured away from the breeding place, and 428 specimens were retrieved, of which 13% were males. One female was captured two miles away from the emergence point on the night of emergence; 26 females were taken up to 8 miles away on the second day; 30 females up to 14 miles away on the third day; and 20 females up to

20 miles away on the fourth day. Most of the recaptures (84%) were within 9 days of release, although one female was captured on the 23rd day. Males were captured up to 12 miles from the release point and up to 20 days after emergence. There was evidence of movement against the prevailing winds, and one female appeared in a trap on a lightship 21 miles from the release point, and 10 miles from the nearest land.

B. R Laurence

Rahm, U. Zur Bedeutung des Duftes und des Schweisses bei der Attraktion von *Aedes aegypti* durch den Menschen. [**Importance of Odour and Sweat in the Attraction of *Aëdes aegypti* to Man**] *Acta Tropica.* Basle. 1957, v. 14, No. 3, 208–17, 7 figs. [17 refs.]

The English summary appended to the paper is as follows:—

"1. Comparative tests (a) on human subjects and (b) between human subjects and an 'artificial arm' suggested that human odour and sweat may play a part in the attraction of mosquitoes to the human hand [see this *Bulletin*, 1957, v. 54, 501].

"2. The test cage, modified for these experiments, is fully described.

"3. The results obtained show that (a) an artificial arm (a warm bottle of 35 °C covered with a moistened cloth) is very attractive; (b) addition of human sweat to the artificial arm doubles the attraction; (c) the air stream together with the odour of the human hand is four times as attractive as the artificial arm alone and (d) as attractive as a normal hand. In order to obtain equal conditions an air stream of 35°C was used in all four test series a–d.

"4. At an air stream temperature of 26°C the attraction of the odour of a hand is not particularly strong; additional heat or moisture, however, doubles its effect, while odour/heat/moisture combined have the strongest attraction.

"5. Normal comparative tests, without an air stream, between human subjects and a warm/moist bottle, and between a warm/moist bottle plus sweat confirm the above-mentioned results.

"6. The results lead to the conclusion that the odour of the human skin plays a significant part in the attraction, while sweat does not considerably increase it."

Lewis, D. J. **Some Sandflies (Phlebotominae) of Malaya.** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1957, Oct. 22, v. 26, Pts. 9/10, 165–71, 4 figs. [16 refs.]

"A collection of *Phlebotomus* contained species which bring the total known in the Federation of Malaya from two to nine. Three new species and a subspecies are described."

See also p. 298, Wright, **Rearing of *Simulium damnosum* Theobald (Diptera, Simuliidae) in the Laboratory.**

See also p. 299, Muirhead-Thomson, **Laboratory Studies on the Reactions of *Simulium* Larvae to Insecticides. I. A Laboratory Method for studying the Effects of Insecticides on *Simulium* Larvae. II. The Reactions of *Simulium damnosum* Larvae to DDT. III. The Reactions of *Simulium damnosum* Larvae to Dieldrin.**

Loddo, B. & Piras, L. Successivi studi sulla popolazione di mosche di dieci paesi della Sardegna. [**Further Studies on the Incidence of House-Flies in Ten Areas in Sardinia**] *Riv. Italiana d'Igiene*. 1957. May–June, v. 17, Nos. 5/6, 271–81, 6 graphs. English summary (5 lines).

In an earlier paper [this *Bulletin*, 1957, v. 54, 763], the authors described a method of measuring changes in house-fly populations of 10 small towns in Sardinia, throughout 1954. They have continued the work, with exactly the same technique, through 1955 and 1956. The additional data have shown a more complex picture, difficult to explain. In 1954 there were two peaks of abundance: a small one in spring and a big one in autumn (the latter was "explained" by high winds which drove flies into the catching stations). In 1955 there were two equal peaks, in spring and autumn; but relation to wind was reversed, since high winds occurred in the summer trough of low catches. In 1956, the curve was again different, having a single high peak in midsummer.

These differences seem not to be due to chance, because similar curves were obtained at most catching stations in each year. No complete explanation for the differences can be advanced, though the authors note that high levels of absolute humidity seem to check abundance of adult flies. *J. R. Busvine*

See also p. 326, Ponghis, Quelques observations sur le rôle de la mouche dans la transmission des conjonctivites saisonnières dans le Sud-Marocain. [**Observations on the Role of Flies in the Transmission of Seasonal Conjunctivitis in Southern Morocco**]

Eldridge, B. F. & James, M. T. **The Typical Muscid Flies of California (Diptera: Muscidae, Muscinae).** *Bull. California Insect Survey*. 1957, v. 6, No. 1, 1–17, 4 maps & 35 figs. on 3 pls. [38 refs.]

Gharpure, P. B. & Pereira, S. L. **Comparative Efficacy and Economics of Pyrethrins and Mixtures of Pyrethrins and Piperonyl Butoxide as Space Sprays against Flies and Mosquitoes.** *J. Sci. & Industr. Res. New Delhi.* 1957, Oct., v. 16A, No. 10, 469–71.

"The toxicity of pyrethrin-piperonyl butoxide mixtures in relation to pyrethrins when used as space sprays against the house-fly, *Musca nebulo* Linn., and the mosquito, *Culex fatigans* Wied., have been investigated. The relative costs based on efficacy have also been worked out.

"For comparable rates of knockdown the pyrethrins are more economical than the mixtures of pyrethrins with piperonyl butoxide against both flies and mosquitoes. In effecting comparable levels of high knockdown and high mortality, however, the mixtures are more economical than the pyrethrins against both flies and mosquitoes."

Sharma, M. L. D. & Rami, H. L. **Comparative Efficacy of 50 per cent Dieldrin-Resin Dispersible Powder and 50 per cent Dieldrin Dispersible Powder.** *Indian J. Malariology.* 1957, June, v. 11, No. 2, 169–72. [11 refs.]

The degree of absorption of 50% dieldrin dispersible powder and 50% dieldrin-resin dispersible powder (a Shell product) into 6 in. × 6 in. local clay blocks, after spraying at 50 mgm. dieldrin per sq. ft., was investigated by chemical extraction, and by biological tests with *Musca nebulo* and *Culex pipiens fatigans*, at weekly intervals for 6 weeks. To estimate the amounts absorbed and on the surface, the total dieldrin down to 5 mm. depth in a clay block was first estimated chemically from representative blocks. In other blocks, cellophane was firmly pressed over the entire surface to lift away the surface crystals of dieldrin: this dieldrin, difficult to estimate satisfactorily, was discarded with the cellophane. An estimate was then made of the dieldrin remaining in the top 5 mm. of these blocks and this is taken to represent the sorbed dieldrin. The difference between the two estimates was taken as a measure of the dieldrin which was at the surface of the blocks.

The insects were exposed for 3 and 6 hours (*Musca nebulo* and *Culex pipiens fatigans*, respectively) to contact with the treated blocks, and—after 24 hours—the mortalities in the first week after treatments were 62% (fly) and 35% (mosquito) for dieldrin alone and 92% (fly) and 65% (mosquito) with the dieldrin-resin preparation. By the sixth week, mortalities with dieldrin were 28% (fly) and 13·3% (mosquito) and, with the dieldrin-resin, 45·3% (fly) and 33·3% (mosquito).

These preliminary results, indicating both biologically and chemically some improvement in the surface retention of dieldrin in the resin formulation, warrant further investigations. It is noted, in this connexion, that the difference between the two dieldrin formulations was elicited only after long exposures of the two insects to the treated surfaces.

D. B. Bertram

Melis, R. Nuove applicazioni di lotta organizzata contro la mosca domestica nel biennio 1955–1956. [**New Observations on the Control Measures against House-Flies in 1955–1956**] *Igiene e San. Pubblica.* Rome. 1957. Sept.–Oct., v. 13, Nos. 9/10. 548–59. 5 figs. English summary (9 lines).

The English summary appended to the paper is as follows:—

"In the years 1955 and 1956 other control measures against *Musca domestica* have been applied in the areas of Chianciano T., Pietrasanta, Massa and Sienna. The fly campaigns have been carried out by using a mixture of Malathion and 0·5 p. cent p.a. in 5 p. cent molasses solution. The results have been everywhere very effective. In the pilot area of Chianciano T., which underwent a special control with 7 treatments in 1955 and 6 treatments in 1956 the amounts of *Musca domestica* emerging from the settled trapping stations ('stazioni fisse di cattura') evidenced a presumable 90·5% reduction in 1955 and 96·5% in 1956."

Melis, R. & Catella, F. Prove di lotta contro la mosca domestica mediante l'uso di malathion con o senza l'aggiunta di cloroderivati e unito a differenti sostanze attrattive. [**Control of House-Flies by means of Malathion with or without Synthetic Chlorinated Derivatives and with Different Attractant Substances**] *Igiene e San. Pubblica.* Rome. 1957. July–Aug., v. 13, Nos. 7/8. 401–15. 2 figs. [18 refs.]

About 75 to 80% control of house-fly by baits of malathion in refined sugars, or beet-sugar molasses, is reported in experiments in 20 rural areas in Italy. Refined sugars appear to be the more successful attractant. *D. S. Bertram*

Hadaway, A. B. & Barlow, F. **The Toxicity of Three Organic Phosphorus Insecticides to Houseflies and Mosquitos.** *Bull. World Health Organization.* Geneva. 1957. v. 16, No. 4. 870–73.

Tests were made of the toxicity of chlorthion, Diazinon and malathion against laboratory strains of *Musca domestica*, *Aëdes aegypti*, *Culex pipiens molestus*, *Anopheles stephensi*, *A. quadrimaculatus*, and a normal strain of *A. gambiae*. Insecticide was applied in solution topically to the thorax. These three insecticides have a comparatively low toxicity to mammals compared with parathion, the acute LD50 values (in mgm. per kgm. body weight) for rats being parathion, 6–15; diazinon, 220–270; chlorthion, 1500; and malathion, 1400–5884. Details of toxicity tests against the insects are given in a table; a second table gives the MLD for DDT, gamma BHC and dieldrin.

The order of decreasing toxicity was as follows:—

(a) for *M. domestica*: Diazinon>chlorthion>malathion, with chlorthion

about as effective as DDT, and diazinon 10 times as toxic as malathion;

(b) for *Aëdes aegypti*, *C. p. Molestus*, and *A. gambiae*: chlorthion>malathion>diazinon. All were more toxic than DDT. *C. p. molestus* was less susceptible than *Aëdes aegypti*;

(c) for *A. stephensi*: Diazinon>malathion>chlorthion;

(d) for *A. quadrimaculatus*: Diazinon>chlorthion. No tests were made for this species with malathion.

The relative toxicity of these organic phosphorus compounds appears to vary considerably from one species of mosquito to another.

D. S. Bertram

Hunter, G. W. & Berrocal, C. M. **A Case of Human Myiasis in Texas caused by the Primary Screwworm, *Callitroga hominivorax* (Coquerel).** *Texas Reports on Biol. & Med.* 1957, v. 15, No. 3, 378–80.

See also p. 275, Lipparoni, Indagini sulle zecche della zona del medio Uebi-Scebeli. [**Observations on Ticks from Middle Uebi-Scebeli, Somalia**]

Papadakis, A. & Hourmouziadis, A. [**Human Pentastomiasis or Case of Human Infestation with *Linguatula serrata* (Pentastome) reported from Greece for the First Time**] *Acta Microbiologica Hellenica.* Athens. 1957, July–Oct., v. 2, Nos. 4/5, 266–72. [In Greek.]

The English summary appended to the paper is as follows:—

"A healthy married woman living in a village of Eastern Macedonia has suffered, suddenly, from acute attacks of cough and sneezing with rhino-pharyngeal secretions and allergic symptoms. The paroxysmal attacks were interrupted by brief periods of subsidence of symptoms, the whole story having lasted for 15 days. During the attacks of cough and sneezing worm-like pieces were expelled with the secretions several times and which were identified as being lymphs of *Linguatula serrata* (Pentastome). More than five months now from the last attack, the woman is quiet and the only symptom still remaining is a light sensation of burning in the upper respiratory routes. The adult stage of the Arthropod was not found, but only nymphs (the patient estimates that about 20 pieces were totally expelled in 15 days). The size of the two specimens examined was: length 2·6 mm., width 1·1 mm. with 90 rings (detailed description is contained in the original paper).

"Though there is a previous report of finding the nymphs of this parasite in sheep in this country, the present case is the first one of human infestation with *Linguatula serrata*, seen in Greece so far."

Sokolova, N. Y. [**The Lowest and Highest Temperature for Mortality of the Bed-Bug (*Cimex lectularius* L.)**] *Ektoparasity.* Moscow. 1956, No. 3, 113–25, 2 graphs. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1957, Nov., v. 45, Pt. 11, 169.]

Details are given of the results of laboratory experiments in Moscow in which large numbers of eggs, nymphs of each instar and adults of both sexes of *Cimex lectularius* L. were exposed to heat or cold for various periods. In tests at four low temperatures, all stages survived exposure for up to five days at −7 or −10°C. [19·4 or 14°F.], and all were killed by exposure for 15 minutes at −32°C. [−25·6°F.]. All stages except the first-instar nymphs were killed by three hours' exposure at −18°C. [−0·4°F.], but 24 hours' exposure was required for complete kill of first-instar nymphs, though they remained torpid for about three days after exposure for 12 hours. The eggs were less resistant than the other stages; few survived after five hours at −7 or −10°C., and none after two hours at −18°C. Adults collected in dwellings were less resistant than adults reared at a constant temperature and exposed to cold immediately after moulting. The females were less resistant than the males, and hungry adults less resistant than those that had fed immediately before the test. First-instar nymphs reared from the eggs of females brought from the south of the Soviet Union showed reduced resistance to cold, exposure to −18°C. for two hours resulting in complete mortality.

Resistance to heat was tested in a saturated and a dry atmosphere. In the saturated atmosphere, the periods of exposure to temperatures of 42, 44, 46, 48 and 50°C. [107·6, 111·2, 114·8, 118·4 and 122°F.] that gave complete kill of all stages were 120, 30, 7, 3 and 2 minutes, respectively, nymphs in the earlier instars being more resistant than older ones, adults or eggs. In the dry atmosphere, complete mortality of adults and nymphs (all of which were in the second instar) was obtained by exposure to the same temperatures for 90, 35, 8, 4 and 4 minutes, respectively, and eggs were equally or more susceptible at all temperatures, except 42°C., at which they required 150 minutes' exposure for complete kill.

Chadwick, L. E. **Progress in Physiological Studies of Insecticide Resistance.** *Bull. World Health Organization.* Geneva. 1957, v. 16, No. 6, 1203–18. [28 refs.]

Webbe, G. **The Action on Fish of Several Chlorinated Hydrocarbons when used as Larvicides.** *Ann. Trop. Med. & Parasit.* 1957, Sept., v. 51, No. 3, 264–70. [11 refs.]

The fish used in these tests were 3 species of the genus *Tilapia*, which are now cultivated for food in many parts of Africa. Each trial of insecticide was carried out in ponds measuring 48 square yards in area,

with a depth sloping from 1 to 3 feet. 30 fish were used in each test, which usually lasted for three weeks, and a control pond was also stocked with fish at the same time. Survivors from a treated pond were kept under observation so that any late deleterious action of any of the insecticides used could be recorded.

Malariol with DDT was highly toxic to fish at a dosage of one quart per acre. Malariol without DDT was not toxic to fish. 2% dieldrin granules were toxic at a dosage of 5 pounds per acre, but not at 2 pounds per acre. Both the insecticides exerted a deleterious effect on the fish surviving after the test.

Gammexane powder (3% BHC) and Caltex oil (0·25% BHC) produced no mortality in any dosage used up to 10 pounds or 4 quarts per acre. 16 weekly applications of one pound per acre of Gammexane did not affect growth or breeding [see, however, this *Bulletin*, 1956, v. 53, 1160].

B. R. Laurence

MISCELLANEOUS PAPERS

Boyd, J. S. K. **Dysentery: some Personal Experiences and Observations.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 471–87. [20 refs.]

Brigadier Boyd, in his Presidential Address, has delved divertingly into the history of dysentery in war and in peace. During the First World War he was stationed in Macedonia from 1916 to 1918 and there, as medical officer to a company of engineers on the march, he contracted bacillary dysentery *in corpore suo* and thus was at this early stage able to appreciate the outstanding signs and symptoms of the infection. This left him with a sympathetic insight into war dysentery. Three waves of epidemic dysentery swept through the Salonika Army in the three succeeding years. In 1916 and 1917 there were just under 6,000 reported cases and in 1918 about 9,000. Exact death rates are not available, but were believed to be 2–3%. Many infections became chronic and the patients had to be invalided. The length of time during which the majority remained under treatment was alarming; one group from Salonika required 250 days, one from Gallipoli 75·6 days. It would probably be fair to state that no one who served in the Salonika Army escaped infection. At the time, however, dysentery took second place to malaria, which decimated the army.

The explanation of these epidemic waves was attributable to horse and mule transport. The result was a plague of flies in unbelievable numbers. It became impossible to eat without swallowing some of them.

In the spring of 1917, being in charge of a mobile laboratory attached to a casualty clearing station through which casualties from two divisions passed on their way to base hospitals, the author had no difficulty in proving that the dysentery was bacillary in type and that amoebic

dysentery was practically non-existent. His attention was then drawn to the cellularity of the stool: a preponderance of pus cells, with large refractile macrophages, proved a ready and practical clue to diagnosis, an opinion shared also by Dr. C. M. Wenyon.

The position in the Gallipoli campaign was confused. It had been claimed at first that 65% of cases were due to amoebic infection, but in November and December 1915, and January 1916, amoebic dysentery disappeared and the incidence of the bacillary type increased. These results were received in England with scepticism which was confirmed by investigations by Wenyon and O'Connor on convalescents evacuated from Gallipoli which showed that only 6·5% were carriers of *E. histolytica* cysts. Serological tests carried out in England showed that the majority had suffered from bacillary dysentery. In Egypt Woodcock, in a careful examination of 659 active cases of dysentery and diarrhoea, revealed that 7·7% were really amoebic, but when this group was broken down into British troops and Indian, only 1·9% were British and 15·7% Indian. Examination of the indigenous population of Egypt revealed that 13·5% of 524 healthy persons were passing *E. histolytica* cysts.

In Mesopotamia the incidence of amoebic dysentery appeared to be higher than elsewhere and in one series of 309 patients with blood and mucus in the stools 26% showed active amoebae, but these were men who had reached a base hospital; in the forward areas the incidence of amoebic dysentery was low. In contrast to amoebic dysentery, bacillary dysentery occurred in epidemic waves, mainly in late summer and autumn.

During and immediately after the First World War Dobell did a vast amount of work on the problems of amoebiasis. At first he thought that some erosion of the mucosa must have been present, even in the healthy carrier, but eventually he recognized that *E. histolytica* could live in man as a harmless commensal. The soundness of this view was shown by the fact that no outbreak took place in Great Britain after either great war.

The idea that bacillary dysentery usually predominated was not generally accepted in India. Owing to various causes and the distance of the laboratories from the dysentery wards, dysentery bacilli were rarely found and, to make matters worse, the majority of bacilli isolated were inagglutinable. This unsatisfactory state of affairs was upset by J. A. Manifold, who, arriving in India in 1924, launched his attack. He succeeded in convincing the sceptics that bacillary dysentery was, as elsewhere, the prevalent type. By his enthusiasm the military laboratories were re-organized and re-equipped and within a few years the standard of bacteriological work reached a high level. The figures of the incidence of dysentery, diarrhoea and colitis for the years 1920 to 1925 were entirely reversed by those obtaining in the years 1930–35. The fall in the incidence of amoebic hepatitis and liver abscess which took place in the same period afforded conclusive evidence that there had been no

increase in missed cases of amoebic infections. On no occasion did amoebic dysentery arise, other than in the form of sporadic cases.

The problem of the inagglutinable Flexner dysentery bacilli remained to be solved. The key of the problem, the author modestly states, was found accidentally when he observed two types of colony on a plate made of one of the " inagglutinable " types. The smooth colony of organisms were inagglutinable; the rough were highly agglutinable. By techniques familiar to serologists it became possible to recognize different members of the group by their specific *surface* antigens and in this manner to identify three new types which comprised most of the hitherto inagglutinable Flexner strains. A few, however, remained, each with a specific antigen, but lacking the group antigen, and these were classified as a separate species.

The author's first experience of dysentery in the Second World War was very disturbing, when two distinguished consultants, one surgical and the other medical, died of Shiga infection in spite of the best nursing and massive Shiga antitoxin. This type of illness—slow in onset and progress, resistant to treatment—was new. The routine treatment was repeated doses of sodium or magnesium sulphate had no curative action in these deadly Shiga infections. The new Shiga antitoxin (20,000 units per ml.) given intravenously in doses up to 10 ml. proved to exert merely a temporary relief. This unsatisfactory situation continued throughout 1940 until in a dramatic manner it was revolutionized by the introduction of sulphaguanidine. This drug was first synthesized in England by G. A. H. Buttle who passed it to Dr. E. K. Marshall of Johns Hopkins Hospital. It proved to be a great success in children. A large batch was prepared and sent to Buttle who was then in Cairo. The results of treatment with sulphaguanidine were at once obvious and they are very well known. Sulphanilamide was not particularly successful; sulphapyridine proved reasonably active; and sulphathiazole compared badly with sulphaguanidine. The Americans preferred sulphadiazine, but the British workers could not agree with them.

An amusing account is given about experiments with bacteriophage which were quite ineffective, and from the stools of German patients treated with phage, colonies of dysentery bacilli, contaminated with phage, but still growing vigorously, were recovered on several occasions. Careful consideration was given to the possibilities of using a dysentery vaccine. Shiga toxoid vaccine sent out by the War Office was tried out on volunteers, of whom the author was one, and proved to cause slow, but severe, local reactions with dysenteric symptoms, so that the attempt had to be abandoned. From experiences with " salted " troops there seems no doubt that some immunity against bacillary dysentery occurs.

The incidence of amoebic dysentery in the Middle East in the Second World War was almost equal to that recounted in the first and was about 5·3%. *Philip Manson-Bahr*

REPORTS AND SURVEYS

Tarizzo, M. L. **Saudi-Arabia—Epidemiological Notes on the Eastern Province.** *Amer. J. Trop. Med. & Hyg.* 1957. Sept., v. 6, No. 5, 786–804, 3 figs. [17 refs.]

This paper deals with the epidemiology of the communicable diseases affecting the Eastern Province of Saudi Arabia, about which data are scanty. It is based on the cases encountered in the clinics and hospitals of an oil company during the last 5 years. Major epidemics did not occur but certain diseases—tuberculosis, malaria, trachoma and some intestinal parasitic diseases—were endemic at a high level.

The geographical and social environment and the people are described and then the communicable diseases encountered are grouped in 4 categories; *viz.*—diseases transmitted through the alimentary system, arthropod-borne diseases, diseases transmitted by contact, and cosmopolitan diseases.

In the first group the commonest parasites were *Trichuris* and *Ascaris*. Schistosomiasis was found in immigrants but was not spread locally. *Entamoeba histolytica* incidence was 10% but was mostly asymptomatic. Hookworm (*Necator*) infection was common among Indians, but the overall incidence was about 1%. *Hymenolepis*, *Echinococcus*, *Enterobius* and *Taenia saginata* were occasionally found in man. Dracontiasis was rare and usually contracted outside the Province.

Among arthropod-borne diseases malaria predominated. In the oases in Qatif area the spleen rate was 96%. All three human parasites were found; *Plasmodium falciparum* was seasonably epidemic and *P. vivax* steadily endemic. Blackwater fever occurred on rare occasions in Saudi Arabs. Visceral and cutaneous leishmaniasis were seen occasionally. *Wuchereria bancrofti* has been seen in 3 persons probably infected outside the Province.

Among the contact infections only trachoma was very prevalent. Leprosy was rarely seen but probably many more cases existed. Cases of maduramycosis, granuloma inguinale and lymphogranuloma venereum have been recorded. Smallpox infections were occasionally encountered; mass vaccination was readily accepted.

Tuberculosis was a major problem and was the most important of the cosmopolitan diseases. Acute generalized infections of adults were relatively common and responded well if treated early. Brucellosis was rare, but was probably missed. Typhoid occurred seasonally in summer and shigellosis, though present, was not a problem. Cerebrospinal meningitis was endemic at a low level with minor epidemics, and paralytic cases of poliomyelitis were sometimes seen.

Diseases which were not encountered include cholera, plague, leptospirosis, relapsing fever, typhus and yellow fever. *T. H. Davey*

BOOK REVIEWS

HAILEY (Lord). [P.C., O.M., G.C.S.I., G.C.M.G., G.C.I.E.] **An African Survey. A Study of Problems arising in Africa South of the Sahara.** Revised 1956. Issued under the auspices of the Royal Institute of International Affairs. pp. xxviii + 1676, illustrated. 1957. New York. Toronto. London: Oxford University Press, Amen House, Warwick Square, E.C. 4. [£5.5.0.]

This volume was compiled in order to provide in easily accessible form an account of the policies of the governments of the various territories in Africa south of the Sahara in administrative, social, educational and other fields, and to review the extent to which modern knowledge is being used in the solution of African problems. The first edition appeared in 1938 [see this *Bulletin*, 1938, v. 35, 934], but changes have been so numerous and extensive that the production of this, the second, edition necessitated the rewriting of a great part of the book. Much of the text had to be handed over to the printers early in 1956, so that when published it was in some respects already out of date. In general, developments up to the end of 1955 have been included, and in important matters some of those occurring in 1956 are noted. The pace of progress in Africa, however, is such that it surprises one to realize that some of the changes not mentioned in this Survey are less than two years old.

The early chapters are concerned with background subjects such as geography, population and peoples. Succeeding chapters then deal with the policies and activities of governments and their various departments, and the final one deals with the organization of research in the many different fields. Almost every aspect of life in Africa is discussed, and contributors who are specialists in their respective subjects have supplied the material for those chapters requiring specialized knowledge. The chapters are divided into numerous sections and these are often subdivided according to the various countries. The chapter on Health has sections concerned with health organization as a state activity, the history and development of medical activities, the diseases of Africa, the problems of nutrition, the organization of health services, medical education of Africans, international cooperation in health work, the payment of fees for medical assistance, health policies, and notes on the principal diseases. By masterly condensation all this matter has been compressed into some 70 pages.

Lord Hailey points out that in Africa the direct activity of the state is so far confined to the application of the curative and preventive uses of medicine. A later stage, not yet reached, will involve a health organization coordinating all those measures which tend to improve or preserve public health, measures often lying far beyond the fields of curative and preventive medicine. There are numerous interesting problems discussed, for example, whether progress in the provision of medical facilities should be by extension of the hospital system under highly trained staff or the

wide expansion of dispensaries under partially qualified assistants. Decisions on such matters cannot be based on principle alone and should be reached after a consideration of all the relevant factors, many of which, *e.g.* education, finance and population density, though not medical, are not less important than the prevalent type of disease, its incidence and the simplicity of its treatment. There is an appraisal of the problem of the status and training of auxiliary medical personnel, and it is emphasized that an attempt should be made to secure a common policy in regard to the classification of medical subordinates and the qualifications required of them. Attention is drawn to the need for deeper study of the extent and character of mental disturbances affecting the people, which so far have been investigated only superficially. For medical men probably the most interesting feature of the chapter on Health is the description of the organization and methods adopted by the French, Belgian, Portuguese and Spanish authorities in African territories.

The chapters dealing with other subjects which may be regarded as particularly affecting health, *e.g.* water, agriculture, education and economic development, prove equally interesting and contain many thought-provoking statements. In regard to education, the comment is made that there has been too ready a tendency to judge of progress in terms of quantity rather than quality; the great mass of pupils who never go beyond the first few standards can acquire little that is of value to them or the society to which they belong. It is pointed out in another connexion that the African working in towns loses the leisure and social occupations which were an integral part of the village way of life. His demand for leisure takes precedence over his desire for material goods, and in fact there is a substantial amount of voluntary unemployment which is chosen in preference to gainful occupation. There is, therefore, need for a study of incentives which will induce the African to raise his efficiency and thus his level of living.

In reviewing a book of the size and scope of this one it is possible only to indicate broadly the subjects dealt with and to express the opinion formed as to the probability of its providing information or exciting interest. The scope has already been dealt with briefly. It is, in addition, a valuable source of data, the references to the literature being quoted in footnotes. Many of these are of particular interest because they are not readily accessible to the ordinary reader.

The book will be specially valuable to those wishing rapidly to be informed concerning developments and policies in fields outside their own and in other territories. The background of each subject is depicted and in controversial matters the arguments on both sides are presented judicially. It is a matter for regret that the widely informed views of the author are so rarely disclosed. The book is, however, not a mere compendium of valuable information concerning the great variety of subjects treated. It gives a detailed yet bird's-eye conspectus of the whole field of African affairs which allows everyone to see his own work in perspective

and its correlation with developments in other departments. Many important questions are posed for which answers should be sought. It is written in an easy and interesting style so that when it is consulted one reads on from sheer interest. Everyone concerned with affairs in Africa will find this book invaluable and should see to it that a copy is available for reference. *T. H. Davey*

Faust, Ernest Carroll [A.B., M.A., Ph.D.] & Russell, Paul Farr [M.D., M.P.H.], with the editorial assistance of David Richard Lincicome, B.S., M.S., Ph.D. **Craig and Faust's Clinical Parasitology.** 6th Edition, thoroughly revised. 1078 pp., 346 illustrations & 7 coloured pls. 1957. London: Henry Kimpton, 25, Bloomsbury Way, W.C.1. [£5.12.6.]

Like Manson's *Tropical Diseases*, this text-book on clinical parasitology continues to be re-invigorated by new editions; it almost occupies the place for North American readers that " Manson " does for British. The subject matter is not quite the same, but the American book is so clinical and the British so parasitological that they cover practically the same scope. The old " Craig & Faust " has now become " Faust & Russell ", and there is no doubt that the addition of Russell's practical experience in the tropics, together with his literary facility, has heightened the value of the new edition to a notable extent. This then remains an invaluable text-book for the student of tropical medicine as well as for the parasitologist. The same logical sequence is preserved, which makes the book so handy for reference, while the embodiment of new work since 1951 brings it up to date in every direction.

The new edition is barely 50 pages longer than its predecessor, but practically every chapter contains new information, which has only been able to be included by careful re-arrangement of the text; thus in the introductory chapters, several general subjects are now treated together, and diagnostic tables are removed from the technical appendix to their appropriate place here.

Several chapters have been completely re-written. The chapter on the Sporozoa includes a description of the new work on the development of the mammalian species of *Plasmodium* and an interesting account of the importance of malaria as a human disease written from the epidemiological standpoint; later in the book, the recent developments in mosquito control are usefully placed in perspective.

The section on the haemoflagellates contains new information, including the epidemiology of Chagas's disease and the new human trypanosomes found in South and Central America. No reference is made, however, to the condition of " mega " now practically established as an important manifestation of *T. cruzi* infections in man. It is strange that the map showing the distribution of trypanosomiasis in Africa is less accurate than

the one in the former edition [where *T. gambiense* is correctly given as occurring on the shores of Lake Victoria].

Entamoeba histolytica is now given a chapter to itself, and the problem of the pathogenicity of this organism and its epidemiology is discussed at length. There are interesting new diagrams of its life cycle and localization.

The chapter on *Toxoplasma* is brought up to date and a section is included here on *Pneumocystis carinii*; but *Sarcocystis* is removed to the chapter dealing with the Sporozoa [to which class it doubtfully belongs and in which it has less significance] and several good pictures of this organism are replaced by a single photomicrograph of a much less typical form.

The helminth section begins with a new diagram of the important human nematodes, drawn to scale, and clearly showing the main differences of these worms; many new tables and diagrams are added to this part of the book, which readers will find to be particularly useful. The edition appeared just too late to enable the important new work on animal reservoirs of *Wuchereria* to be included, but it does contain a brief reference to the rôle of monkeys in the epidemiology of loiasis in West Africa. The treatment section of the filarial worms is expanded.

The section on arthropods and human disease is brought up to date chiefly in reference to new measures of control by the synthetic insecticides and concludes with a short paragraph on insect resistance to these substances which doubtless will be considerably enlarged in future editions.

Much of the technical appendix has been re-written, and a clear account is given of the best procedures to follow for the examination of faeces for parasites, for biopsy material, at autopsy, etc. Culture techniques and immunological diagnostic procedures are given separate chapters, and are brought up to date.

The book is printed well on semi-glossy paper, is copiously illustrated with diagrams, photomicrographs and good coloured plates, and includes useful bibliographies at the end of each chapter. The paper is too heavy for the binding and the cover comes loose.

[For a review of the 5th edition, see this *Bulletin*, 1951, v. 48, 1159.]

P. C. C. Garnham

Gelfand, Michael [O.B.E., M.D., F.R.C.P.]. **Livingstone the Doctor. His Life and Travels. A Study in Medical History.** With a foreword by C. Hely-Hutchinson. pp. xix + 333, frontispiece, 18 figs. on 18 pls. & 4 maps (2 folding). 1957. Oxford: Basil Blackwell, 49, Broad Street. [42s.]

A hundred years ago Livingstone was in the middle of his travels, and central Africa was largely unexplored. The story of his journeys is now

well known, and many accounts have been written of the immense difficulties he overcame, until in the end he was defeated by illness. The picture that has always emerged is of a man of uncommon force and drive, whose energies were stimulated and directed by unshakable religious convictions, and whose object was first to open up Africa so that religion could be brought to the Africans, and second to introduce western medicine.

In the present book Gelfand has placed more emphasis than is usual on the medical side of this story, explaining that Livingstone's intention in beginning the study of medicine was to spend his life as a medical missionary. First he thought of China, but immediately after qualification he sailed to begin his work with the London Missionary Society in South Africa.

The medical story is full of the tragedy of the time, when fever dominated the tropical picture and the death rate in Europeans was enormous. In 1840, however, quinine was known and was a great improvement on the old preparations of cinchona bark, but apart from quinine the doctor had few remedies of any value. Experience taught Livingstone how to make the most of his meagre stores of drugs, and the famous " Livingstone rouser " of jalap, calomel and quinine, followed by quinine alone given to the point of cinchonism, gave such good results in malaria that it was widely adopted. But even with this his record of the long journey to Loanda on the west coast, and back, is a record of dozens of attacks of fever. Later he appears to have developed some degree of immunity to malaria—the attacks of fever became less severe and less frequent, but dysentery was troublesome to the end.

Livingstone made many observations on disease in Africans. They were of the usual 19th century type, with close observation of clinical and epidemiological features but made in complete ignorance of the causes of the diseases noted. He was an observer and a clinician of skill and was receptive of new ideas from Europeans and Africans alike, but he was not, like Manson, a medical research worker, though the qualities of mind and character which make the geographical explorer are not so different from those which make the medical explorer—except for the special iron in the soul which will not yield to physical hardship, and which all geographical explorers, and Livingstone above others, possess.

Like other explorers, Livingstone was happy when he was in command, and we may wonder if the deep motive for his work was the subconscious need to be not only the pioneer and the missionary, but also the beneficent head of the community in which he lived. But whatever the motive, we must admire the courage and undeniable greatness which clothed it.

Gelfand has brought out much interesting medical detail, taking his facts from published and unpublished sources, and he writes with authority. He has not displayed the intimate, human, aspect of Livingstone's personality, or illustrated fully his personal relationships with his wife

and family and those with whom he worked, but he has made a notable and interesting contribution to a great history. *Charles Wilcocks*

Lewis's Medical, Scientific & Technical Lending Library. **Catalogue of Lewis's Medical, Scientific and Technical Lending Library. Part I.—Authors and Titles. Part II.—Classified Index of Subjects, with Names of Authors who have written upon them.** New Edition. Revised to Dec. 31, 1956. pp. xii + 1178. 1957. London: H. K. Lewis & Co. Ltd., P.O. Box 66, 136, Gower Street, W.C.1. [To Library Subscribers 25s.; to Non-Subscribers 42s.]

Since its establishment in 1848 Lewis's Lending Library has rendered a unique service, first to the medical profession and later also to scientists and research workers in a wide range of technical subjects. This new edition of the catalogue contains about 28,000 titles, a thousand more than the previous edition published in 1950. When the numerous duplicates are taken into account the number of volumes in the Library and in circulation is over 100,000. Old editions, books no longer in demand, and out-of-date text-books have been withdrawn, but many works now out of print are included, though not those so old as to be only of historical interest. The Library contains American as well as British publications and even a few from other countries when they are in the English language. About 50 current annuals and reports are also added as published.

Besides its primary purpose of informing subscribers what books are in the Library, another is to serve as a bibliographical reference work. It has long been known to medical librarians that often the quickest and handiest way to check the title, date and price of a given book is to consult Lewis's Catalogue. Part II, the Classified Index of Subjects, is also a useful guide to what works in English of recent date are extant on a particular subject. In this case, however, consultation is not always so easy or speedy as with Part I, which is arranged by authors. According to the preface " the suggestion that the Dewey System of Classification should be followed . . . was considered but . . . it was again decided not to attempt it ". For this we may be thankful, but a far simpler suggestion has already been made on several occasions by word of mouth by the present reviewer. The arrangement is alphabetical by subject, and under each subject is an alphabetical list of authors, followed in many cases by an abbreviated word indicating the nature and scope of the book. Thus, to take an example, books on neurosurgery must be sought either under *Surgery*, where in a list of 136 authors four books on the desired topic will be found scattered about but distinguished by the abbreviation (neuro-) or (neurol.), or else the 244 entries under *Neurology* may be scanned to reveal in this case a score of items distinguished by such indications as (surg.) and (n.-surg.). The suggestion is merely to bring items on each topic together under a suitable subheading under the main

heading. The four books now scattered under *Surgery* would then appear together under the heading *Surgery, Neurological*, and so with all the others. Most of the abbreviations in parentheses would thus become superfluous, effecting probably a 30% reduction in the number of lines of type and cost of printing. The time required to find the four books in the above example would be reduced by about 97%, a saving of perhaps 1½ minutes. This method of simultaneously reducing the cost of production and of greatly increasing the efficiency of the index is recommended for the serious consideration of the publishers.

Cyril C. Barnard

FALCÃO, Edgard de Cerqueira. **Novas achegas ao estudo da determinação da especificidade do "Schistosomum mansoni".** [Further Data relating to the Study of the Determination of the Specificity of *Schistosoma mansoni*] Preface by Carlos CHAGAS. 211 pp., illustrated. 1957. Santos: Caixa Postal 796, Estado de São Paulo, Brazil.

This magnificent and well turned-out volume is to be regarded as a further token of filial piety to a distinguished master—Professor Pirajá da Silva—and as a companion to the author's previous communication, *Estudos sôbre o "Schistosomum mansoni"* (*1908–1916*), published in 1953 [see this *Bulletin*, 1953, v. 50, 1152].

In this work all the evidence which the author had previously summarized is set forth *in extenso*. Here, in fact, are the actual correspondences with Da Silva from many famous personalities in tropical medicine; in some the actual script is reproduced and there is little difficulty in recognizing the careful and easily decipherable handwriting of Professor R. T. Leiper and comparing it with the more vigorous and less legible calligraphy of Sir Patrick Manson. There are others from LE DANTEC, Albert HENRY, LORTET, BRUMPT and R. BLANCHARD, and a number of printed and typed communications from Adolfo LUTZ, A. Looss and others. No testimony has been forthcoming from L. W. SAMBON who served as the butt of these various contentions and who first suggested that *S. mansoni* might be a distinct species.

This volume also contains a list of the author's publications—64 in number.

Philip Manson-Bahr

WELLCOME MUSEUM OF MEDICAL SCIENCE. 39 pp., 28 figs. (21 coloured). [1957.] London: The Wellcome Foundation Ltd., The Wellcome Building, Euston Road, N.W.1.

This museum was founded in 1914, and was then designed to foster interest in tropical medicine. Later it was expanded to cover every aspect of medicine, but after the Second World War it was reorganized by Dr. C. J. Hackett to concentrate once more on the diseases of hot countries. Much thought went into the planning of the exhibits, and

the result is an attractive and very informative display of specimens, photographs, drawings, diagrams and literature, all designed to lead the student in a logical sequence from the origin and transmission to the control of the various diseases. The art of appeal to the eye and through this to the understanding has been developed with skill and success, and the atmosphere of the museum is one of stimulation.

The present brochure, beautifully illustrated in colour, describes the sections of the museum briefly. The chief of these are devoted to diseases due to protozoa, bacteria, helminths, fungi and viruses (including rickettsiae), tropical haematology, nutrition and medical zoology. There are facilities for study, and the atmosphere is inviting. This is an excellent museum, well worth serious examination. *Charles Wilcocks*

Reis, J. & Nóbrega, P., with the collaboration of A. S. Reis, R. C. Bueno & M. Giovannoni. **Tratado de doenças das aves.** [Diseases of Birds] 2nd Edition. Vols. 1 & 2. 391 & 416 pp. Vols. 3 & 4. 318 & 429 pp., numerous illustrations. [1955 & 1956.] São Paulo: Instituto Biologico, Caixa Postal 7119, Brasil. Ediçoes Melhoramentos.

These two books contain an extensive and comprehensive account of the diseases of birds; the species of birds include wild as well as domesticated. Volumes 1 and 2 are bound together and contain descriptions of the diseases caused by viruses, by bacteria and fungi; volumes 3 and 4, which are contained within the second book, deal with those produced by protozoa, arthropod parasites and helminths. The final chapters of volume 4 include accounts of the diseases associated with errors in nutrition and the abnormalities of special organs; these are followed by a consideration of poisons and poisoning, fertility and its irregularities, therapeutics, anaesthesia and methods of disinfection which may be applied in poultry premises.

Each chapter deals with a disease or group of diseases and there is a useful list of synonyms; the distribution of the disease and its frequency in the species of birds which are susceptible are described. The aetiology of each condition is discussed and, if an infective agent is concerned, its characteristics in the laboratory, its behaviour in the field and in experimental animals are described fully. An account of the pathogenesis of a disease precedes that of the symptoms, the pathological anatomy and the histopathology; treatment and preventive measures are considered in the light of the reservoirs of infection and the dissemination of the infection. Non-infective diseases are considered in a comparable manner and most of the chapters have a section on differential diagnosis. The treatments are not conservative and the drugs advocated in the different conditions range from carbon tetrachloride to the sulphonamides, the newer antibiotics and the vitamins. Diseases range from fowl pest, botulism in wild duck, blackhead in turkeys, and the varieties of bird malaria to

perosis, neoplasia and ringworm. There are excellent bibliographies at the end of each chapter as well as a general one and an index of the subjects which are included. A perusal of these alone gives a measure of the exhaustive nature of the work, which is as complete as any in the field of avian diseases. *R. Lovell*

NOTICE

ROSS INSTITUTE OF TROPICAL HYGIENE

Lay Course in Tropical Hygiene
To be held from 14th to 18th July, 1958

The annual course for laymen will be held by the Ross Institute this year from Monday, 14th July to Friday, 18th July inclusive.

The course is designed specially for planters, mining engineers and other non-medical people who may be responsible for the health of industrial labour forces in the tropics. Admission is not restricted to such people, however, but is open to any non-medical men and women proceeding to the tropics.

The course consists of some formal teaching which is liberally illustrated by films, visits and demonstrations. The subjects covered include malaria and its control, other tropical diseases, nutrition, housing, sanitation, and protection against heat. The teaching is given by leading experts in each subject.

There is no fee for the course. Recognising its value, many companies pay the expenses of their staff during their stay in London, and the Ross Institute Standing Committee hopes that this practice will become general.

It would be appreciated if agencies and firms would inform their managers and assistants that this course is being organised and would encourage and assist them to attend. The names of those proposing to attend should be sent as soon as possible to the Organising Secretary, but amendments and additions may be made at any time up to the date of commencement of the course.

It would be helpful if intending students would state their occupation and the country or district to which they are going. This will enable the organisers to arrange the programme according to requirements.

Further information on the detailed arrangements will be sent to those who have enrolled about a month prior to the date of the course.

Further copies of this notice will be sent on request to:—L. G. PONSFORD, *Organising Secretary*, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, Keppel Street (Gower Street), London, W.C.1. *Telephone*:—MUSeum 3041–4. LANgham 7621–5.

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